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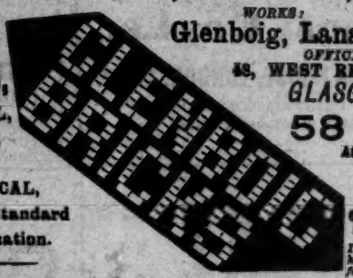

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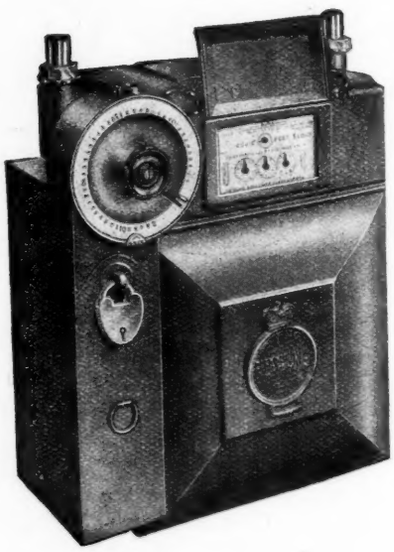

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VOL. CLX., No. 3104.] WEDNESDAY, NOVEMBER 8, 1922. [74TH YEAR.

EDITORIAL NOTES.

The Education and Examination Scheme.

THE scheme for the education and examination of those engaged in the technical work of the gas industry, or rather who are qualifying to do so, was published in last week's "JOURNAL." It is still undergoing the scrutiny of the members of the District Associations, and it is to be submitted to the members of the Institution of Gas Engineers at a special meeting in February. From the indications already before us, it does not seem likely that there will be much revision (if any) of the scheme in its present form. It appears to commend itself as fully covering requirements, though looked upon as tentative in its detail, and subject to any amendments that time, experience, and expediency may suggest. In this matter, the Institution have been working in co-operation with the Board of Education. As mentioned last week, there have been difficulties in formulating a scheme. Those difficulties are not discerned until one gets into close grip with the chaotic conditions that exist, and try to unify them and make provision for all and sundry wherever located—all who desire to be armed with certificates of qualification in an industry that demands higher competence to-day than ever before, and that will claim in the future all the educated ability that men in the chief executive positions can bring to bear upon their work. No one who boasts of any capacity for penetrating affairs can question that progress and maintenance of the interests of the industry require from the men who will occupy the chief places something more than a mediocre training. The scheme will promote a higher standard of education and training, with consequently higher standards of certification. The benefit of this will be largely that of the industry; but the technical men of the gas profession will also derive advantage, in that their greater qualification must impart a larger power in, and interest to, work, and must progressively raise the levels of remuneration to figures more in accord with duties, obligations, and responsibilities.

An interesting article by Mr. Walter Hole explaining the scheme appears in this issue of the "JOURNAL;" and those who read what the author (writing with inside knowledge) says will come to the conclusion that the men who have drawn-up the scheme have done so with comprehension and tact. There were many matters for consideration, as affecting students, schools, curriculum, teachers, examinations, &c., which had to be legislated for in the scheme; and it seems there is not much (if anything) that is pertinent that has been left without due regard and incorporation. The scheme appears to be a compromise between existing conditions and what would be an ideal scheme if the conditions were all on one suitable plane. But they are not; so that practical treatment conforming to what obtains, and so generally applicable, had to be adopted. The article by Mr. Hole shows how the Institution, acting in co-operation with the Board of Education, assumes new responsibilities—in fact, to the Institution we shall hereafter look as the central authority for technical educational work in the industry. That is a very proper extension of the functions of the chief technical organization. It is a pity they were not extended in this manner long since. What is being done now could have been done several years ago. But it seemed to be nobody's business to make a move; although suggestions were from time to time offered, nothing ever came of them. There was no immediate hurry; and so time flew by, leaving the matter still in a neglected, amorphous state. But this is now to be altered, from root and branch to the uppermost crowning point in examination. There is to be satisfaction as to the equipment at educational establishments, qualification of teachers, curriculum and syllabus of instruction, as well as control in the matter of "inside" examinations. And machinery is devised for ordering and guarding matters relating to courses and examinations beyond the primary stages. All this is necessary in order to ensure equality of certification. Otherwise there would be little value in the whole scheme for the students and the gas industry. This, of course, all means that the technical educational institutions where the training of men for the industry proceeds will, under the scheme, have to fall into line. This must be, if they desire students who are seeking to qualify for technical work in the industry, because they will want to go out into the world armed with the recognized certificates in either gas engineering or gas supply, or in both, and, if possible, with the highest of all prizes—a diploma.

The article by Mr. Hole makes plain the intentions of the scheme, its scope, and progressive lines. This relieves us from traversing it here. He shows, too, how dangers have been avoided, how the isolated student has been provided for, and describes the machinery for the control and management of the courses of instruction and examinations. There will be an Advisory Committee, consisting of representatives of the Institution of Gas Engineers, of the Junior Gas Associations, and of the Board of Education. We are particularly glad to see that the Junior Associations have part and place in the scheme. There is also to be a Board of Examiners, who will set the questions and mark the papers in the examinations for the higher certificates and diploma, and also conduct the oral part of the examination for the latter. Progressive improvement of the scheme is provided for by the setting-up of a Consultative Committee, consisting of members of the Advisory Committee and representatives of teachers, who will meet at least once a year to consider matters arising out of the practical working of the scheme. The meeting will include members of the Board of Examiners, so that any matters mutually agreed upon may be promptly adopted. The danger of the primary "inside" examination is that teachers who are also the examiners, if left to their own devices, would adopt different standards of examination papers. This is one of the very things that there has been an attempt to avoid. Therefore, for these initial examinations, assessors are to be appointed whose duty will be to exercise control over the questions, and confirm the subsequent marking of the papers.

In the gas industry we are everywhere gradually moving to higher standards of operation. The work of no undertaking of any pretensions can stand still. It must expand, and do so on lines of the best attainable efficiencies. Over the whole of the work, men who are themselves efficient must preside. The scheme is designed to provide these, and a continued supply. The day will come when the certificates and diplomas issued under this scheme of education and examination will be an essential feature in the requirements from men making application for appointment to technical positions in the industry. What this means needs no explaining to those aspiring to such offices, nor to those who govern our technical educational institutions.

Aspirations of the "Junior" Organizations.

IT has been observed in recent utterances of Presidents that the Junior Associations are aspiring to a larger recognition and part in the technical region of the gas industry. We admire them for this. The fact was noticed by us in alluding to one address delivered at the opening of the

present session's work; and we find pronounced emphasis of this aspiration in the Presidential Address of Mr. C. F. Rendle to the Midland Junior Association, and of Mr. D. Cleave Cross to the London and Southern Junior Association. These Junior Associations (in the inauguration of which the "JOURNAL" many years ago took a prominent part through a series of articles entitled "Wake-Up! Sons "of the Gas Industry") have become an indispensable part of the technical system of the industry. We are not prepared to-day to say that their value is one whit less than that of the senior organizations; and for a very good reason. We have before the gas profession to-day a much belated scheme for the education and examination of those who are training for undertaking technical positions in the industry; but the education of the gas man does not by any means cease with the so-called training stage. Technical education in the gas industry is a perennial thing; and our technical organizations are among the instruments that continue the education. Between the days of training and the days of qualification for admission to the Senior District Associations there was formerly a big gulf. This gulf the Junior Associations have filled. They have linked-up training days with the educational work that goes on among the senior engineers through the papers, discussions, and pooling of experiences that their organizations make possible. What the senior organizations were doing, the Junior Associations now also perform with remarkable ability, as seen in addresses, papers, and discussions, the quality of which is almost invariably good. Through them the educational work among the young men of the industry is broadened and deepened. The value of this to the gas industry cannot be denied. It is, in fact, freely and frankly acknowledged on all hands.

This being so, it is quite a legitimate aspiration on the part of the junior organizations that a stronger inter-relationship or bond should be established between them and the senior organizations. This, as Mr. Rendle expresses it, would render the Junior Associations less isolated units than they are at present. He suggests that the Joint Council of the Junior Gas Associations forms a step in this direction; and its excellent work in connection with the new education scheme for gas engineers will, he hopes, be fully recognized soon. But that step is not sufficient. In his opinion, a closer bond than this would be both desirable to the junior organizations, and beneficial to the gas industry. In Mr. Cross's address, there was acknowledgment of the recognition that has so far been given to the Junior Associations; but there is further recognition that he would like to see—that is, a closer affiliation between the Junior Associations and the Senior District Associations. The Presidents of the two junior organizations are therefore of one mind on this subject; and we must say that their case is a strong one—the junior bodies having, by effort and actual work over a time sufficiently long for many juniors to become seniors, proved that they are an indispensable factor in (regarded in the broad sense) the technical educational work of the industry. Mr. Cross further points to the fact that the Senior District Associations are affiliated to the Institution of Gas Engineers, and each district is invited to send a representative to the Council of the Institution. This suggests a plan that would meet the present case. He respectfully submits to the Senior District Associations that this same principle be extended, and a closer relationship be established between the two Associations in each district by sending an invitation to the juniors to nominate a representative to the Council of the Senior Association. He feels sure this would be much appreciated, and would be beneficial to both. It is clear from the remarks of the two Presidents that what the juniors want is simply and solely some tangible form of alliance; and we can see that this would be to the interests of both the junior and the senior organizations. In other words, they want the links forged that would complete the chain of technical educational work, and at the same time testify to the oneness of aims and objects. It is from the junior organizations that the ranks of the senior organizations are recruited; but it is getting quite a noticeable feature to find that, when juniors become seniors officially, and then members of the organizations of the latter, they frequently also continue membership of the former. The Junior Associations are helping to make men of higher qualification for the professional offices in the industry; and, in our opinion, the Senior District Associations could in no better way recognize the work that is being done—and well done—by them than by considering the suggestions made, and by acting upon them if a better method of linking-up cannot be devised.

In view of the recognized value of the work of the Junior Associations, there is another matter which we hope will receive the attention of all who are in chief positions in connection with gas undertakings. This is the question of gas undertakings defraying the reasonable expenses of their assistants in attending the meetings of the Junior Associations. The matter was referred to at the Yorkshire Junior Association meeting by Mr. C. S. Shapley, the City Gas Engineer of Leeds. It was also the subject of an announcement by the President, Mr. H. L. Bateman; and subsequently Mr. Cross alluded to it in his address at the meeting of the London and Southern Junior Association. It transpired that the Bradford, Leeds, and Halifax Corporations pay the expenses of the juniors of the Gas Department who attend meetings; the Harrogate Gas Company have agreed to do the same; the Elland-cum-Greetland Gas Company, the Sheffield Gas Company, and the Dewsbury, Blackburn, and Cleckheaton Councils pay half the expenses. This is all to the good. There is encouragement in this for the juniors—some of whom have pockets not any too well-lined—and it is to the interests of gas undertakings that there should be this encouragement in view of the educational and stimulating value of the meetings of the Associations. We hope to see more of this form of practical help. The juniors are enthusiastic in their work; and the sympathy and tangible help of their employers will do much to maintain this.

Gas and Electricity Supply Combinations.

FOR many years past, there has been advocacy in the columns of the "JOURNAL" of the combination of gas and electricity supplies in areas where there is obvious economy in so doing, or where competition means such cutting of charges that neither concern can have profitable existence. Some nine months ago, however, an editorial article appeared in our pages in which it was pointed out that such combinations were being made a matter of specialist work by the firm of Sir Charles Bright and Partners, Ltd. They saw a large undeveloped field in this direction, which, in their opinion, it would be to the general interests to cultivate; and there were the prospects of an active, though quietly conducted, campaign in this direction. It is only natural in these times that communities should desire both services, and that there should be the option on the part of any householder, shopkeeper, or factory owner, of patronizing one or the other as his preference dictates or as economy or convenience urges. We are, of course, gas partizans; but we do not carry partizanship to the extent of saying that householders and others should not have the opportunity of exercising their choice. We also recognize that, if gas undertakings do not, where there is no electricity supply, provide one, there we have always an open invitation to a competing company or local authority supply to come in; and this in many cases to-day would mean that both services would cost the consumers more than if provided under one administration—that is, would cost more if the two undertakings were to be profitable, and not to commence to pace the road that leads to bankruptcy. However, in the editorial article in the "JOURNAL" for Feb. 1 last, it was remarked that the new campaign for amalgamating the two supplies in suitable areas would mean much labour, and that there would be considerable obstinacy on the part of custom and current method before there was general consent to yield to a commonsense union. Those words can hardly be said to have been prophetic. They stated what was an obvious fact to anyone who had studied the position and character of the bias environing it. The words have proved true. Those who have worked in this field have by no means had a walk-over. They have had to present data and schemes that have been thoroughly well analyzed and searched by those concerned; but the soundness of case and argument is seen in the results, which are of a character that was not anticipated would have matured so quickly. Already, combined gas and electricity schemes are in hand for Barry, Port Talbot, Retford, Spalding, Oakham, Crowborough, and Swanage; and other companies and local authorities have the matter under their consideration. We believe, too, that other consultants have schemes in preparation. This union marks progress in public utility service; and progress such as this cannot be delayed by armchair obscurants.

Labour at the Polls.

A FEATURE of last week's events was the heavy defeat of socialistic labour at the municipal polls. For the time being, interest in this almost pushed the General Election into the background. Then the rout was put forward as significant of a like success in dealing with the organized attack that is being made by the socialistic element upon the constituencies, in the attempt to get a majority in Parliament. That may or may not be. There are large differences in the situation which must be taken into account. Some of the papers referred to the results of the municipal elections as a "defeat of labour," without characterizing the brand of labour in the political sense. It was not a "defeat of labour;" it was a defeat of extremists, who are the would-be misleaders of labour. In securing the triumph, working-class voters—representing sane and self-respecting labour—took a not inconsiderable part. Here we have illustrated one of those mistakes into which some people so easily fall, when they speak as though socialistic tenets or communism were an inseparable part of the political being of labour. A greater error could not be made. Working men and women are found in every division of political thought and principles. And when they mass themselves, and exercise their voting power, they can send about their business that small section of men who no more represent their opinions than does the "man in the moon." The socialistic labour element in this country has, comparatively speaking, no numerical strength. The members of it can only show power, and reveal the results of their revolutionary policy and actions, when they get into office, as they did in some London boroughs at the previous election. In these they have left behind them a very fine legacy of financial mismanagement, which their successors will have to endeavour to put right. In one or two places, these men have retained a major power; but otherwise a clean sweep has been made of their fellows, or they have been reduced in numbers to a state of impotence. The voters have obviously had enough of their destructive tactics and spendthrift policy.

There is not on our part the slightest objection to the representatives of genuine labour on our governing bodies, and on boards of directors of joint-stock enterprise. We believe it is an excellent thing to have them there; and for more reasons than one. They should have a voice; they should be allowed to learn from immediate contact of the difficulties of the administration of local affairs and of industry. This does good. It is one of the best antidotes to the work of the revolutionaries. But when those of ultra-istic tendency get on to our local councils, their policy is one of pure mischief; they prefer destruction to construction. They have a liking for irrational spending, and for eschewing economy. They also make the lives of the chief officials of the local bodies almost unbearable through doing all possible to undermine discipline and authority. They are there to do those things which have for their object the setting of class against class, instead of all pulling together with the common good as the purpose. They are the biggest and most active enemies of the working class; and if the majority of the rank-and-file of the trade unions would only show a bold spirit, instead of neglect, they would kick these loud-tongued political mountebanks from their counsels and corporate work with good speed. There are signs here and there of the revolt of the rank-and-file of unions against the rule of extremist leaders. It was seen the other day in the South Wales coal-fields, when, on the question of the employment of non-unionists, notices of a withdrawal from work were ordered to be handed in, but 72 p.ct. of the men refused to obey.

In connection with the early parliamentary election, the "programme" of these people includes a capital levy and other juggling with finance; and all that is being proposed in this way, any man with even a modicum of intelligence can see is merely going to help to debilitate industry and trade, and therefore the earning power of the working classes. These men, their very proclamation of ideals shows, cannot see farther than their noses. The day is all they care about; the future is no business of theirs, but it is of people with well-balanced minds. Since they issued their conceptions of a highly impracticable policy, they have become somewhat nervous regarding the reception that their professions of intention and ambition have received. They have therefore hedged somewhat, and now wish all whom it may concern to know that no corporate body, limited liability company, bank, co-operative society or friendly society, or trade union would come within the ambit of the levy. Nationalization of land, railways, mines, public utility undertakings, and so forth is also among the objects of socialism; but the level-headed working man looks for an illustration of the results of such a proceeding, and finds it in Switzerland. There he sees the growing expensiveness of the railway systems since the nation took over their management, and that the people now wish private enterprise would again handle them. Then whatever the political creed of those who labour and are not socialists or communists, away to the polls on Nov. 15, to defeat the machinations of those who would do evil to this country of ours!

Untaxed Salaries—House of Lords Decision.

A correspondent calls our attention to an important decision of the House of Lords. A railway company under a contractual obligation to pay the salaries of certain of its officials tax-free, set aside the necessary funds for the payment of the tax; and finding themselves taxed for the sum so set aside, they appealed, and carried the appeal to the House of Lords. It was urged that, in the absence of any clear words in the assessing statutes, the construction put upon these statutes, which had been uniformly allowed during the past sixty years, should be continued. The appeal was dismissed on the ground that the officials in question received from their office pounds in tax and income-tax in respect of their salaries; and it was on the two sources of profit that tax would have to be calculated. The complication of charging tax on a tax had not hitherto arisen, because the Board of Inland Revenue had allowed the tax as part of the salary. Consequently the decision now given means in effect that where such contractual obligations continue, the Government will collect a commission by way of increased assessment, and presumably the commission will have to be found by the public in the case of public utility undertakings. Thus (remarks the correspondent) "whatever could have been said formerly against a principle which removes individual interest in national expenditure, in Finance Acts, and in the vagaries of Chancellors of the Exchequer, can be said in stronger terms if it misplaces the burden of income-tax, and consequently the burden of the Great War." In his opinion, "payment of salaries tax-free can no more be justified than can payment of dividends tax-free."

Pooling Surplus Coke for Sale.

A suggestion as to coke sales that may be overlooked appears in the recent address of the President of the Midland Junior Association (Mr. C. F. Rendle). He was dealing with the dumping of coke at cut prices. There are local agreements to alleviate the ill; but he submits that properly constituted regional committees, representing suitably grouped districts, and provided with the necessary data and statistics, could equitably deal with the pooled surplus coke from gas undertakings within their areas in their best markets. Such a course, Mr. Rendle says, might reasonably be expected to operate to the mutual, and not inappreciable, advantage of all the undertakings concerned. Interaction between the various committees might often be necessary at certain periods; but Mr. Rendle thinks this should present no serious working difficulty. In his opinion, such a scheme could be inaugurated by a branch of one of the existing centralized organizations, without necessarily establishing new machinery for its operation.

Low-Temperature Gas and the Therm.

In this issue of the "JOURNAL," Mr. Walter Chaney continues his statistical investigation of works manufacturing results, in order to show that the use of low-temperature gas as an enricher, instead of oil, is a profitable proceeding. It is plain that Mr. Chaney has endeavoured to be very moderate, as he has not placed the value of the low-temperature gas at any higher figure than 750 B.Th.U. per c.ft. In the present article, he takes the manufacturing figures of three works—actual and not hypothetical cases; and so possibly gas engineers will be looking very attentively at the data to see whether or not they have application to them. Perhaps the total coal carbonized and the total oil used will be a guide. Anyway, for other engineers the cases will be found to be illustrative; and they suggest that, under the therm system, low-temperature gas as an enricher has

a miraculous effect in producing savings on coal and oil. When the figures are studied, there will doubtless be engineers who will be sceptical; but Mr. Chaney would like to know whether anyone can detect any flaws. He has himself been astonished, and has scrutinized his figures with the view of finding error, but has failed. If any other engineers are more successful in discovering vitiating points, he would be glad to see their criticisms, because the one thing he desires is to be accurate in this matter.

The Gas Coal Position.

Gas undertakings that are not being supplied under contract will at the present time find that the pressure for deliveries is causing a great shrinkage of the available supplies in the open market. The reports as to pressure come from all quarters. Durham and Northumberland are being heavily drawn upon for supplies to the London and other gas-works down south, as well as for export. Whether we turn to Yorkshire, Lancashire, North Wales, or Nottinghamshire and Derbyshire, the same report is made as to large calls for delivery. In fact, it is stated that in Yorkshire at the moment there is almost complete absorption of the best screened sorts on offer, though secondary qualities are available in considerably reduced quantities. Naturally, these conditions strengthen the current bargaining position of the collieries.

Electricity Joint Authority Finance.

There is a large amount of feeling current regarding the financial powers granted to the joint electricity authorities, and particularly as to the lending of borrowed money to these authorities by municipal bodies. Local industries and other ratepayers will be strongly opposed to this; and therefore it will be well to remember, as pointed out this week by the Parliamentary Committee of the London County Council, that the Lord Chairman of Committees has given notice of a proposal to amend the Standing Orders of the House of Lords, so as to provide that persons objecting to any Special Order under the Electricity (Supply) Act, 1919, may petition against the Order not later than seven days from the date on which it is laid on the table of the House, and that, in the event of any such petition, the Order shall be referred to a Joint Committee of both Houses, or to a Select Committee of the House of Lords, before which the petitioners will be entitled to be heard. We have referred to this matter before; but there is no harm in giving this reminder.

"Anthracite."

Sir Isaac Pitman and Sons, Ltd., of Kingsway, W.C. 2, have recently added to their valuable handbooks on common commodities and industries "Anthracite, and the Anthracite Industry," by A. Leonard Summers. The price of the book is 3s. net. The first three chapters deal with the South Wales field, with the physical and chemical characteristics of anthracite seams, and with the general conditions of life and labour. A chapter is devoted to the economics of the subject, makes reference to the work of Dr. Fishenden and Prof. Barker, and discusses anthracite from the domestic point of view. Chapter V. is entitled "The Industrial World," and reviews steam raising with anthracite, its application in motor transport, and the advantages of mixing it with other coals for boiler firing. Irish, Scotch, American, Canadian, and other anthracites are examined; and reference is made to patent fuels, and to the problem of spontaneous combustion. The final chapter, "Smoke Abatement and Coal Conservation," is perhaps nearest the gas man's heart. The author cites Prof. Leonard Hill, Dr. J. S. Owens, and Lord Newton's Committee; and he gives some interesting statistics relating to coal consumption on our railways, and the aggravation of the smoke nuisance. Discussion of coal conservation leads to a brief reference to low-temperature carbonization; and the closing subject is headed "Electricity Wasteful." At the end of the book some interesting miscellaneous mining notes are published. Nineteen illustrations of surface views and plant details are given, which add to the interest of a very readable and informative little volume.

Southern Association Agenda.—We have received from the Hon. Secretary (Mr. W. H. Bennett) the agenda for the annual general meeting of the Southern Association of Gas Engineers and Managers, which, as already intimated, is to be held on Thursday, Nov. 23, at 2.30, in the Charing Cross Hotel. After the election of office bearers for 1923, two papers will be read and discussed—one by Mr. Thomas Carmichael, M.Inst.Mech.E., entitled "The Economic Aspect of Modern Carbonizing Methods, Exemplified by Results and Working Costs at the Portsmouth Gas-Works;" and the other by Mr. John Terrace, of the South Suburban Gas Company, on "The 'Dominion' Flow Meter." Afternoon tea will be served at the termination of the business.

PERSONAL.

Mr. Hugh Dunford Smith, analytical chemist, of Newcastle, has been appointed Gas Examiner for the borough of Tynemouth and the urban districts of Whitley and Monkseaton, Earsdon, and Seaton Delaval.

Mr. J. W. Bolton, Outdoor Superintendent to the Pudsey Gas Company, was the successful Liberal candidate in the Lowton Ward of Pudsey (of which he was the retiring councillor) at the municipal elections last week.

The wedding took place on Saturday last of Mr. Harold Talbot, A.R.C.Sc., B.Sc., son of Mr. and Mrs. Talbot, of Leeds, to Miss Marion A. Pickles, of Whipps Cross Hospital, Leytonstone. The ceremony was performed by the Rev. M. Davies, Chaplain of Whipps Cross Hospital, at St. John the Baptist Church, Leytonstone. The bride was given away by her father, and Mr. R. H. Palmer, O.B.E., acted as best man. Among the guests at the reception were Mr. C. S. Garland, Conservative candidate for South Islington, Mr. J. R. Yates, Chairman, and many members of the staff of the Welsbach Light Company, of which the bridegroom is General Manager.

A Committee of students of the Chemical Department of Manchester University has been formed to honour Prof. H. B. Dixon on his retirement after 35 years' service as Director of the Department. There is to be a dinner in the Midland Hotel, Manchester, on Dec. 8, at which Prof. Dixon will be the guest of the evening; and subscriptions are invited to raise a fund, to be handed over to the University authorities, from which the income will be given as grants-in-aid to necessitous students of chemistry, and to purchase a medallion portraying the head of Professor Dixon, to be placed in the Chemical Theatre. Dr. J. E. Myers is Hon. Secretary, and Dr. Norman Smith Hon. Treasurer to the Committee. Applications for dinner tickets, and donations to the fund, should be sent to Dr. Smith, at The University, Manchester.

Mr. E. H. Clarry, younger son of Mr. George Clarry, the General Manager and Secretary of the Cardiff Gas Light and Coke Company, is to be congratulated upon having been appointed Technical Representative to the British Mannesmann Tube Company, which is under the control of Messrs. Baldwins, Ltd., the great steel workers of South Wales. Mr. Clarry will be stationed in the South Wales area, extending from Carmarthen to Bridgend. After leaving Emanuel School, London, Mr. Clarry served his articles with Mr. H. D. Madden, Chief Engineer to the Cardiff Gas Company, and was subsequently appointed by the Directors Assistant to Mr. Madden. During the latter part of his service he has specialized in the distribution work of the Company, and has had extended experience in high and low pressure distribution, both with cast-iron and steel mains, with welded joints under high-pressure conditions. When war broke out, Mr. Clarry was called-up to his unit, the Glamorgan Yeomanry, Machine Gun Section, eventually receiving a Commission in the 6th Batt. Welch Regiment in 1914. Going to France with that unit in 1915, he ultimately acted as Adjutant to the Battalion, and at the present time holds a Commission in the Glamorgan R.G.A. "T." Mr. Clarry has been enthusiastic in the social section of the Cardiff Gas Company, and has been an active member of the Athletic and Social Club there, which has a membership of 750.

Mr. Harry Kendrick, who had just completed 27 years' service with the Stretford gas undertaking (which formerly belonged to a Company, but has now been taken over by the Stretford and District Gas Board), retired from the position of Engineer and Manager on the 31st ult., and is making a claim for compensation for loss of office based upon the Civil Service rules. Mr. Kendrick complains that, since the Board took over the gas undertaking, he has been excluded from all the meetings of the Board, and that many acts which are the business of the Engineer and Manager have been performed by, or on the advice of, someone else, without his knowledge. Readers of the "Journal" will hardly need to be reminded of the excellent work done by Mr. Kendrick over a long series of years in connection with different organizations of the gas industry. In particular, mention may be made of the Manchester Institution of Gas Engineers, of which he was Hon. Secretary for several years up to 1908, and occupied the Presidential chair in 1910; while he has also figured in the Association's proceedings as a paper reader. His other activities on behalf of the profession, to the furthering of the welfare of which the whole of his energies have been devoted, have included the Examinership in "Gas Supply" for the City and Guilds of London Examinations. Mr. J. Hall, the Secretary to the late Company, also retired on Sept. 30; the Clerk to the Stretford Urban District Council having been appointed Legal Adviser and Clerk to the Gas Board.

OBITUARY.

Mr. Rees Jones, who was Chairman of Directors of the Blaenavon Gas and Water Company, died last week, at the age of 63.

The death occurred on Friday last, at the age of 74, of Dr. T. W. Parry, J.P., the Chairman of the Ferndale Gas Company.

ELECTRICITY SUPPLY MEMORANDA.

THERE will be rueful countenances among those electrical men who are anxious to see the development of super-generating stations, and supply to distributors by joint authorities. They see, among the manufacturers of the country, an expanding antipathy to the super stations. The manufacturers have good reasons for their attitude. They know that by their own private plants they can obtain electricity at very low prices. For one thing they have no distribution expenses; and for another most factories require steam or other means of heating, and so there exists *in situ* the fundamental factor in self-supply. But another consideration that is growing with factory owners is the question of the rates. They are high; and industry feels it acutely, and is not disposed to look with any friendly feelings upon local authorities embarking upon speculation in company with others, and thus possessing but a fraction of control over the expenditure. That there is a good deal of apprehension in this respect is shown by evidence given before the Electrical Commissioners when inquiring into the question of a joint authority for the North-East Midlands. There was opposition from influential coal-owning organizations. The South Yorkshire Coal Owners' Association were represented; and it appears that, in the colliery part of the area, they pay about one-third of the total rates. They are opposed to any further exploitation of the district by municipal effort; and when they use the words "apprehension" and "alarm," it shows that their feeling is of rather a deep order. They prefer that the Yorkshire Power Company should develop their business in the manner that seems best to them. Evidence to much the same effect was given on behalf of the South Yorkshire Coal Trade Association; but when Mr. C. P. Markham spoke on behalf of the Derbyshire and Notts Coalowners' and Ironmasters' Committee, he showed how largely private supply had been economically developed. He instanced among others the Staveley Ironworks with their 9000 KW. plant. In the works and collieries under his control in Derbyshire, there are some 12,500 KW. installed and 150 transformers. Staveley supplies about a quarter of the energy the Sheffield Corporation are doing. Various subsidiary companies have been started. The Company are supplying the Chesterfield Corporation at 0·4d. per unit; while the little companies are charged 1d. This is for high-tension energy. The groups have rejected a scheme for a super-power station; they prefer smaller units. They strongly object to buy energy at a heavy price from the joint authority. That is very natural. The Chairman made a remark to the effect that he thought Mr. Markham was under a misapprehension; but Mr. Markham said they had been given to understand that they would have to buy current from the super-power station. To this the Chairman replied that he thought this was a misconception of the scheme. Supposing it is, it does not dispose of the point as to speculation and the obligation of the ratepayers. But the main question is, Can the super-power stations supply at a lower price than these local private plants? If not, then it cuts away a very powerful argument for such stations; and what is more, the fact deprives those stations of very influential users of electricity. It is wonderful how knowledge is increasing respecting the possibilities and the impossibilities of such stations. A convincing letter appeared in "The Engineer" for Oct. 27, showing the cost of the self-provision of electricity in factories requiring steam and heat for winter, or for industrial purposes, as compared with taking a supply of current from an outside source, while maintaining plant for heating purposes. The latter system exhibits an extraordinary cost in comparison with the private plant supplying both heat and steam. Manufacturers are looking into relative costs; and they are not likely to be caught napping.

The Super and the Private Station.

Power Companies in the Reorganization Schemes.

The "Electrical Times" makes a very fitting reference to the position of the Power Companies in the electricity supply reorganization schemes. They were factors that could not be overlooked, for the simple reason that they were already there, and some of them have been doing pioneering work in bulk supply for the past twenty years—not, however, excepting latterly in two or three cases, with very lucrative results. This our contemporary realizes, when it says "the pioneer years in this section of the industry have been rather unduly prolonged, and in some cases entailed much uphill work." The Electricity Supply Act of this year has recognized the important functions of the Power Companies, and has given them protection and encouragement. In the schemes of reorganization, they take prominent place. This has been referred to in the "Memoranda" from time to time; but our contemporary sums-up what has been done. The North Wales Power Company are taking principal part in the plans for the supply of that area. To the North Metropolitan Company and the Metropolitan Company are being delegated the supply powers of a joint authority in their respective areas. On the north-east coast, the Newcastle-on-Tyne Company are apparently satisfying the Electricity Commissioners to such an extent that no "district" has been prescribed in that quarter. The Shropshire, Worcestershire, and Staffordshire Electric Power Company are working with the Birmingham Corporation in dealing with the South-West Midlands district. The Yorkshire Power Company will also be found taking a foremost place in the final plans for the area in which it is operating. This increased recognition and position in the reorganization schemes should be of vast importance in improving the prospects of the Power Companies.

Salesmen Conferences.

This season there have already been three electric salesmen conferences in London; but we have not heard of any of London gas salesmen. Those of the electric salesmen have, the reports tells us, been attended by large numbers. The papers presented have been good for the purpose of raising discussions; and they have been successful in this respect. At the first conference, lighting was the subject; at the second and third, electric cooking and heating were under consideration. At the opening conference the Chairman was Mr. Ll. B. Atkinson; and he stated that the Electrical Development Association intend to carry the conference movement as far as possible, and to have similar conferences in the provinces. He referred to the difficulty experienced at exhibitions to get proper information as to the goods exposed for the inspection of the public. This is attributed to the fact that most of the attendants are purely commercial men, without the necessary technical qualification for giving serviceable information.

Neglect of Lighting.

The sale of lighting units brings in most money per unit to the electricity supply industry—much more than the sale of units for heating and cooking. Yet effort nowadays seems to be largely concentrated on the latter branch of the business—through the obsession of the undertakings that they have large valleys in the twenty-four hours' curve that want filling-up. That is true in districts that are not industrial; and it is an undeniable thing that the greatest prosperity is to be secured by having the capital expended on plant uniformly employed. At the same time, it must not be overlooked that electric heating is a branch of business that comes only in winter time, and then heating is required during lighting hours quite as much as during the hours of daylight. They are cheaper units, too, than lighting units; and they have to be through force of circumstances, though during lighting hours the cost of production per heating unit is just as much as per lighting unit. So they are, in fact, at any time of the day. There is also a largely accepted view in the electricity industry that the electric lighting business can now well look after itself, leaving concentrated effort for the other parts of the business. At the first electrical salesmen conference in London, the paper was by Mr. W. E. Bush; and it was on the subject of the lighting business. It was a strong indictment of the grave neglect which he finds abounds in the electricity industry in connection with the main part of their business. That indictment has application in many other quarters than the electricity industry.

The Scope for Lighting Business.

Mr. Bush finds large scope for extending and improving electric lighting. The work of this branch of business should not be confined to effort in getting electric lighting into premises which are at present illuminated by some other agent. There is a very profitable field for the development of sales of new equipment in buildings already wired, and in which old-fashioned and obsolete lighting appliances obtain. This condition of things, according to the paper, appear to have a ubiquity that is surprising. It is found in industrial and commercial premises, in shops and shop windows, churches and other institutions, and in private houses. Of the total number of factories in the country, he estimates (on what basis is not known) that probably only 30 p.ct. have proper lighting equipment. Much of the lighting, too, is carried out in a haphazard way. Everything possible he finds is done at the electricity producing end to realize high efficiency; but when it comes to the utilization end, production efficiency is lost in gross inefficiency. In commercial lighting, too, the standard is far too low. Mr. Bush comments on the dismal appearance of some of our banks, insurance offices, &c. Since the war large numbers of opal-bowl semi-indirect fittings have been installed. The author seems to condemn these, when he says there is an opportunity here for replacing them with the new totally enclosed distributing fittings which have recently been developed. But really one cannot expect customers to adopt one style of fitting to-day, and then to-morrow discard them for something else. Consumers will resent such rapid changes. The new fittings to which he refers are described as dust-proof, distinctive in design, and have many other qualities which will appeal to a consumer; but they must be brought to his notice, or he will not know of their existence. That is true; but there must be discretion, and not too much importunity. It is quite true that, when an installation has been made, the tendency is to leave it alone until the consumer makes a move. That, of course, is wrong. Mr. Bush urges that it should be the business of the salesman to be "constantly pushing the consumer." That, too, is wrong. A middle course must be taken between neglect and making oneself a perfect nuisance. The nuisance is as bad as the neglect. From Mr. Bush's observation, he is of opinion that at least 60 to 70 p.ct. of shop windows require new lighting gear; and quite wisely he admits that there are tens of thousands of unshaded glaring lamps obstructing the vision and impairing the

sight of the general public. We cannot deny the accuracy of his statement. Such conditions, he says, are probably retarding the progress of electric lighting; and yet shop windows should be a means of advertising the light. He criticizes much of the work that is done in connection with church lighting. He finds, too, that dwelling-houses are frequently wired for a minimum number of points, many in unsuitable positions, and quite with the simplest form of lighting appliances. Then what happens is that the installation is left at that. It seems to be nobody's business subsequently to ascertain whether or not there is room for improvement, or to advise the consumer in the matter of lamps that will give him the best return for his money. The author finds even in dwellings that garish unshaded lights are plentiful.

Whose Fault is all This?

Mr. Bush holds that the electricity supply industry is not making sufficiently rapid progress; and he attributes this to the fact that there are so few trained salesmen in touch with the public. This is not the fault of the salesmen. The blame must be put upon those who administer the affairs of the industry. We wonder whether or not the salesmen who were at the conference were touched by this. How many of them indulged in a little introspection to ascertain whether they are properly trained and efficient? But Mr. Bush was right not only in regard to the electricity supply industry, but other industries trading in public utilities. There is too much opportunism in commercial life, and too little looking forward to the future. We know of a district in which the shops were extensively fitted some months ago with gasfilled lamps without any attempt at shading, and this on the recommendation of electrical men. Most shopkeepers have now restored metallic filament lamps. However, one of the best advertising schemes the electricity industry can indulge in is to try to set right all the defect to which Mr. Bush calls attention, but to which so many electrical writers are blind. There is plenty of work to be done; and so to sit still simply waiting for business to turn-up is idiotic. This applies to many quarters in the gas industry, as well as to the electricity industry.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

Visit to the Carron Works.

Some eighty members of the Association visited, on Saturday, Oct. 28, the well-equipped works at Falkirk of the Carron Company. The party on arrival were received by Mr. George (the Manager of the Gas-Fitting Department) and other members of the staff.

A round of the works was then commenced; and the Juniors had the opportunity of following the manufacturing process from the raw iron ore to the finished article in the form of modern gas appliances, &c. On their tour through the gas department, the visitors realized, perhaps more than ever before, the manifold ways in which the Carron Company attempt to meet the demands made upon them by the gas industry in the manufacture of modern gas apparatus. Opportunities of viewing these in their several states—from the rough undressed casting to the finely-finished article as supplied to the gas consumer—were afforded; and the guides were never lacking with informative details and data of instruction and interest.

At the close of the inspection, the members of the Association were entertained to tea by the Directors of the Carron Company; and before separating, Mr. W. J. Lennox, of Falkirk (the President of the Association), acknowledged the kindness of the Company, not only in the hospitality shown, but in the exceptional facilities for seeing over the works.

Mr. George, responding on behalf of the Company, remarked that his firm and the members of the staff were always pleased to be of whatever assistance they could to any body of men officially connected with the gas industry.

Standardized Gas-Burners.

It was stated recently by Dr. S. W. Stratton, Chief of the United States Bureau of Standards, that, in the discussions at the Natural Gas Association convention in Kansas City, in which the Bureau took part, it was brought out very forcibly that poor gas service is often due to lack of standardization and improper piping of houses. It was strongly urged that the Gas Association should co-operate with municipal authorities to bring about improvement in this respect. Part three of the Bureau's national gas safety code covers this matter very fully, and every effort will be made to get this portion of the code in an acceptable condition for adoption by municipalities. Considerable time has been spent during the past few weeks by experts of the Bureau of Standards in making examinations in consumers' homes of the completeness of combustion of gas when used in ranges having detachable tops. Many of these devices appear to be very dangerous to health, and the Bureau consider thorough research on this subject to be of great importance. Tests are being conducted on burners submitted to five manufacturers of gas appliances; and reports will be prepared on the results of these tests as soon as completed.

MIDLAND JUNIOR GAS ASSOCIATION.

Visit to the Parkinson Stove Company's Works.

About eighty members of the Association had the pleasure of inspecting the works of the Parkinson Stove Company, Ltd., at Stechford, last Saturday afternoon. The party, on arrival at the works, were received in the offices by Mr. D. M'Callum Gibb (Managing-Director of the Company), Mr. Eric Cheshire, Mr. Weipert, and several members of the staff. Three detachments were formed under the respective guidance of Mr. Davy (Works Manager), Mr. Jordan, and Mr. Gibb, and the tour of the works was commenced. The Parkinson Stove Company are well known to everyone in the gas industry as makers of high-grade gas cookers, fires, and water-heaters; and the members had a fine opportunity of noting the thoroughness with which all the goods are manufactured, and the up-to-date methods employed to ensure that highly efficient apparatus only shall be turned out.

In the water-heating section, where the "New Cottage," the "Treasure," and other heaters are made, the various parts were seen in the several stages of manufacture, in the hands of coppersmiths, tinsmiths, polishers, &c., and afterwards assembled as units and in the hands of the testers. The details were fully explained, and all apparatus was shown at work with test meter and thermometer available. From here a visit was made to the enamelling shops, where the gas-stove linings, enamelled plates, &c., are made. The enamel-melting furnaces, powdering mills, &c., were demonstrated, and also the methods of stencilling in use for obtaining line-work on certain plates before these are actually fired in the large coal enamelling muffle in this department. An interesting feature was the production of meter-dials for an associated Company's meters. The whole process was shown, from the first firings in the special gas-heated furnace installed for the work, through the printing to the final firing. Here also were enamelled a large number of ash trays, which were handed to members at the tea provided later. They were inscribed to commemorate the visit of the Association.

The members were then conducted through the foundry, where are produced the thousand-and-one different castings required for constructing the cookers, fires, and burners manufactured. The casting sand was examined, the engine and blower supplying air to the cupola, and the cupola itself. The necessary grinding operations were seen before passing on to the fittings shops. Here fire parts, cooker parts, &c., were inspected in many stages of machining operations. Special interest was taken by members in the method employed for obtaining accuracy and uniformity of position of the holes in a gas-fire burner, and also in the fixing of brass nozzles into these holes, giving the accurate flame diameter so essential for efficient working with the modern radiant.

In the japanning shops the various spraying and blacking operations were seen. Messrs. Parkinson are prepared to finish their products in almost any colour to suit the tastes of gas engineers, showroom salesmen, or the ultimate user of the article. Gas-heated drying stoves are used for all stoving operations. The assembling, testing, and show rooms were extremely interesting. A collection of finished fires and cookers was available, and much attention was paid to the various details which go to make up an efficient article—particularly in the new "Holborn" gas-cooker, with new pattern hotplate burners, allowing cooking utensils to be placed directly on top of them without interfering with combustion. Also the "Minster" and "Westminster," truly gas-fire "cathedrals," were shown. In a room adjoining were arranged a "Beasley" recording gas-calorimeter, made by Messrs. Parkinson and Cowan, and an all-copper street-lantern with outside adjuster and automatic lighting and extinguishing control. It was noted that Messrs. Parkinson are themselves large supporters of the industry they serve; the whole of the excellent lighting of the offices, works, and foundry being by low and high pressure gas. The majority of the manufacturing processes requiring heat application are also carried out by means of town gas.

At the close of the inspection, the party assembled in one of the main offices of the Company, where tea had been laid out at the invitation of the Directors.

Mr. GIBB, who presided, welcomed the Association, and hoped that everyone had spent a profitable afternoon in the inspection of their processes of manufacture, which they endeavoured to make as up-to-date as possible, so as to enable their products to be placed on the market at prices to encourage purchase and gas sales. He trusted that any member who might like further information on any point would pay a private visit to the works.

The PRESIDENT (Mr. C. F. W. Rendle) proposed a hearty vote of thanks to the Directors, Mr. Gibb, Mr. Davy, and Mr. Jordan, for the instructive and interesting afternoon, and also for the generous hospitality extended. He said three impressions had been formed in his mind during the afternoon. The first was the excellence of the works they had inspected, the second was the courtesy of the staff, and the third was the large attendance of members. He spoke of the co-operation necessary between makers of gas apparatus and gas suppliers, to enable the industry to move forward. In concluding, he especially thanked Mr. Gibb for arranging for the departments to be at work during the afternoon.

Mr. L. H. THOMAS (Senior Vice-President) seconded the vote, and referred to the progressive policy of the Company.

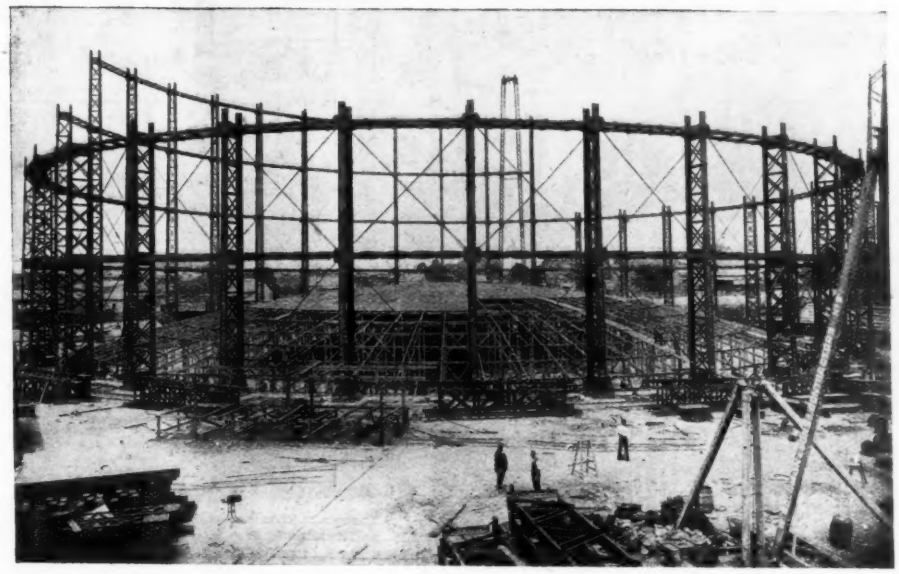
Mr. R. J. ROGERS (Birmingham) supported the vote, which was carried with acclamation.

Mr. GIBB and Mr. DAVY thanked the members, and again expressed the pleasure it had been to show them over the many departments.

DESIGN AND CONSTRUCTION OF A 12½-MILLION GASHOLDER.

By R. J. MILBOURNE, Assoc.M.Inst.C.E., F.C.S.

(*Continued from p.* 306.)



VIEW SHOWING GUIDE-FRAMING IN COURSE OF ERECTION, CROWN SHEETING, AND TIMBER FRAMING.

GASHOLDER.—INNER LIFT.

The inner lift is about 288 ft. in diameter by 46 ft. 6 in. deep from the outside edge of the outer curb to the bottom of the cup. The rise of the crown is about 25 ft., measured from the root of the angle curb. The usual rise of 5 p.ct. of the diameter of inner lift is not sufficient for gasholders of this size. The radius of the crown is 427·22 ft., which gives a rise equal to 8·68 p.ct. of the inner lift diameter, thus reducing the strain in the top curb, as the tension in the crown sheets is proportional to the radius of the sphere of which the crown is a segment. The centre plate is 6 ft. in diameter by ⅜ in. thick, and the ring next to it is ¼ in. thick. The outer ring of plates—*i.e.*, the margin row, or those to which the outer angle curb is secured—is 60 in. wide by 1 in. thick; the second margin row is 46½ in. wide by ⅜ in. thick, and the third ¼ in. thick. The remainder of the crown is formed of sheeting No. 8 Imperial Standard gauge thick.

Two manholes and seals are fitted in the crown over the inlet and the outlet pipes. This is a very necessary provision, and is practically indispensable in all large holders, as it admits of ready access to either the inlet or the outlet pipe inside the holder when the holder is at rest, without discharging the gas contained in the crown of the holder. The radial form of crown sheets was adopted in preference to rectangular sheets, since, though the latter method of construction would tend to reduce the initial cost, it is not possible to make such good work.

The top or hanging row of the inner lift sides is 27 in. deep by ⅞ in. thick, and the next row below it ½ in. thick. Between these strong rows and the ¼ in. thick cup row the sheeting is divided into 68 bays by the vertical stays, to the back of which ⅜ in. by 1 ft. 6¼ in. plates are riveted, and to these the side sheets are attached. The thickness of the side sheets in these bays is No. 9 Imperial Standard gauge, while that of the margin row next above the cup row is ¼ in. thick.

TOP CURB.—INNER LIFT.

The top curb is of a compound character, and consists of an 8 in. by 8 in. by 1 in. steel angle at the junction of the crown and sides, to which is double riveted the 5 ft. by 1 in. double-butt jointed and double riveted plate forming the margin row in the crown, and the 2 ft. 3 in. by ⅞ in. plate, which is also double-butt jointed, forming the hanging row. The inner curb is of plate ¾ in. thick and 1 ft. 5½ in. deep. This is also double-butt jointed and double riveted to the 5 ft. by 1 in. plate through 6 in. by 6 in. by 1 in. angle and stiffened at the bottom edge by means of 5 in. by 5 in. by ⅝ in. angle. The bottom of the inner curb is also braced to the outer curb through the upper part of the vertical stays, and intermediately between each of these by 5 in. by 3 in. by ½ in. tees, and by 3½ in. by 3½ in. by ½ in. angles running diagonally to the vertical stays, and joining them at the bottom of the second hanging row.

As the top curb is entirely in compression, it is very desirable that the ends of all angles should be planed in order to ensure the bars being metal to metal, so that the curb may be able to take up the strain of the other three lifts when the holder is fully inflated. As the first and second rows of strong plates next the top curb form part of same, the radial seams are butted together and riveted up with cover strips, so that the pressure is carried by the entire cross-section of each plate.

The angle strut between the inner and outer curb was introduced to distribute the stresses more uniformly over the whole section of the top curb; and for this purpose the struts were arranged as near as possible in a direct line from the outer to the inner curb, thus—

The resultant of all stresses upon the top curb is practically horizontal and passes through the outer angle-steel member.

[A diagram and calculations showing the factor of safety in the top curb is given in an appendix to this article.]

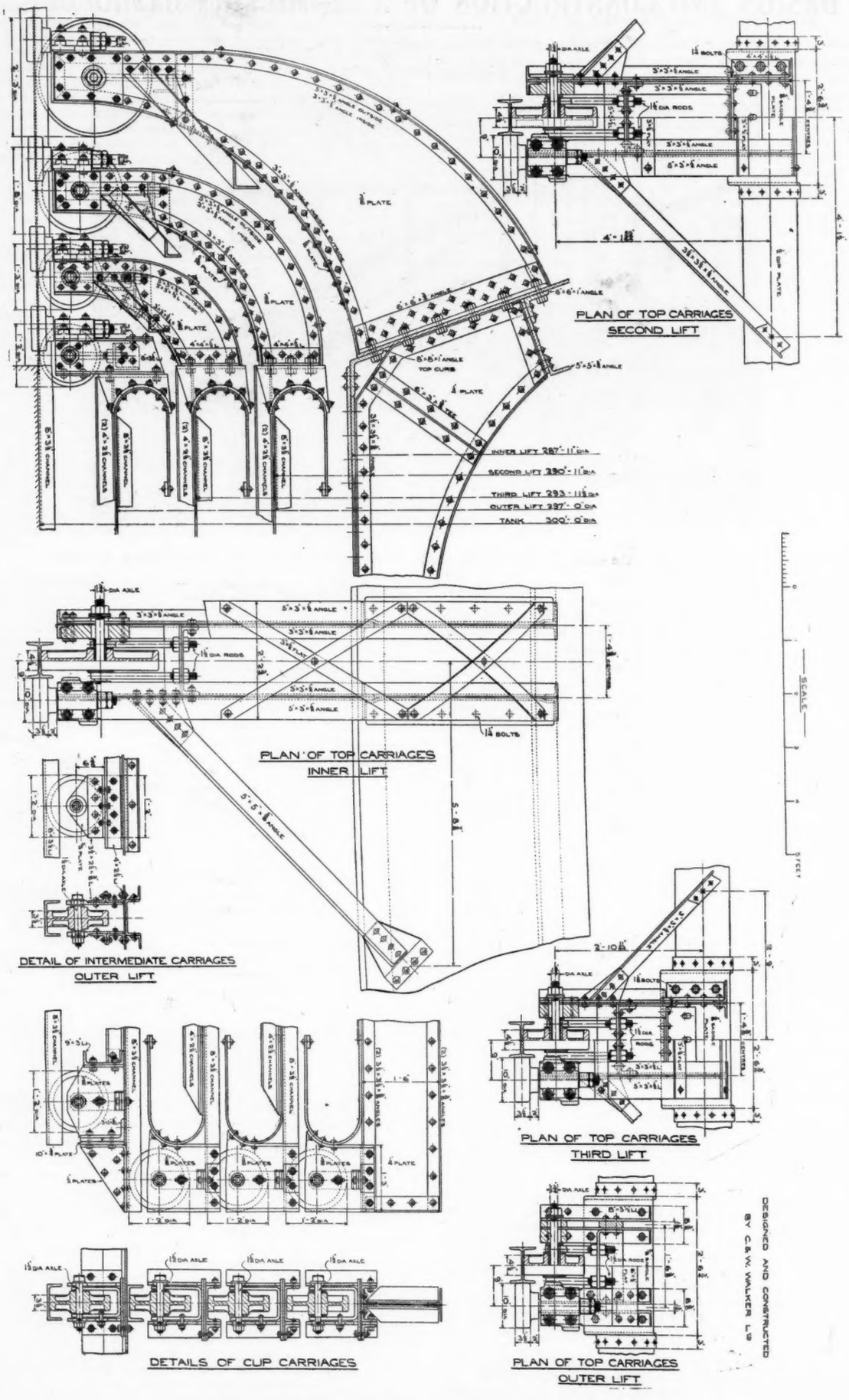
VERTICAL STAYS.

The vertical stays, 68 in number, are designed to stiffen-up the composite top curb at the top, and, resolving into a uniform width of 1 ft. 6 in., extend 1 ft. 3 in. below the bottom of the cup. The web is made of ¼ in. plates stiffened at back and front by means of two angles 3½ in. by 3½ in. by ⅜ in.

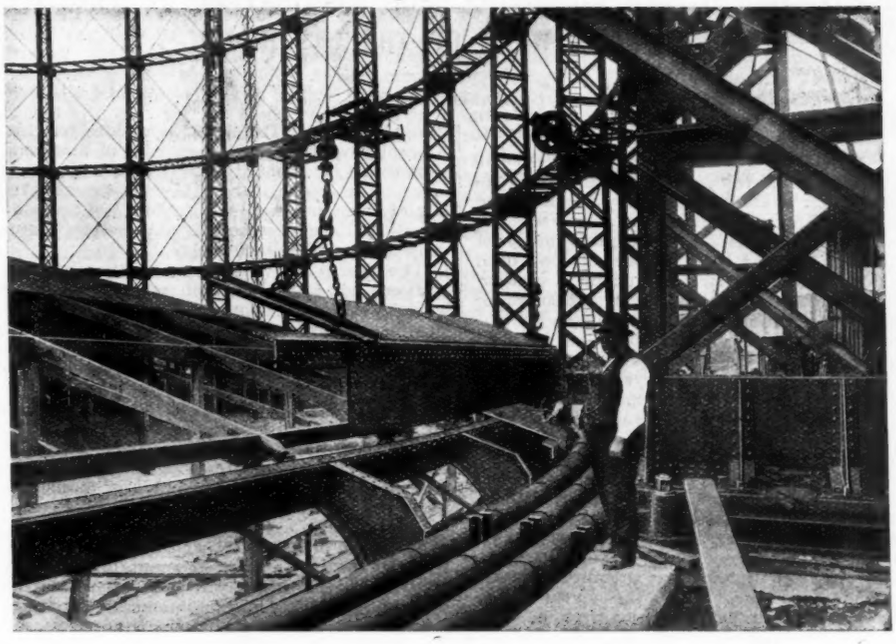
It will be noticed* that instead of joggling the angle of the vertical stay at the top curb, this angle is "kneed" in order to keep it clear of the rivets securing the top and side sheets, thus ensuring that the pitch of the rivets should be uniform, and that these could easily be made perfectly gas-tight.

The inner lift vertical stays were designed as shown on the drawing, and attached to the side sheets in order to transmit a

* The drawings prepared in connection with this serial article, constituting (as they do) such a distinctive feature of the contribution, have been distributed through the five instalments; the detail here described having appeared last week.—ED. "G. J."



GASHOLDER—12½ MILLION CUBIC FEET CAPACITY.



VIEW SHOWING TOP CURB DURING ERECTION.

portion of the outward pressure of the gas on the side sheets to the top curb, for the partial relief of the stress on the curb, as well as to resist any tendency of the side sheets to distort.

The vertical guide-stays on the other lifts were also attached to, and made one with, the side sheets, as it assists the sheeting to resist distortion.

The lap-jointed plates forming the 2 ft. deep cup are ½ in. thick, bent U shape; the lengths being lap-jointed and riveted. They have internal beading, and are provided with cast-iron bearing blocks.

SECOND AND THIRD LIFTS.

The respective diameters of the second and third lifts are 290 ft. 11 in. and 293 ft. 11½ in., each having a depth of 46 ft. over cups and dips, which are formed of ½ in. bent plate in the case of the second, and $\frac{7}{16}$ in. bent plate in the case of the third lift.

The cup and dip hanging rows are ¼ in. plate, and the intermediate sheeting is No. 9 Imperial Standard gauge. Within each lift there are 68 vertical guide-stays of 8 in. by 3½ in. by 3½ in. channels, having 1 ft. 6¼ in. by ⅜ in. plates riveted to their backs, and a 3 in. by 2½ in. by ⅜ in. angle riveted to each flange. These channel stays extend 1 ft. 3 in. beyond the bottom of the cup. The vertical stays are further strengthened for the whole of their length by two 4 in. by 2½ in. by ⅜ in. channels riveted to the outside of the back plates.

OUTER LIFT.

The diameter of the outer lift is 297 ft., and its depth is 46 ft. from the top of the dip to the underside of the curb. The dip and hanging row are of similar construction and thickness to that of the third lift. The 68 vertical channel guides with their stiffening angles, back plates, and external stiffening channels, are also exactly similar to those used for the third lift, and the thickness of the intermediate sheeting is the same.

BOTTOM CURB.

The bottom curb is of compound construction, and is made very stiff and rigid to allow the rollers to be put well up to their work without the danger of springing; as not only is the satisfactory working of the holder assured by attention to this point, but its stability largely depends on this detail. The curb consists of a 9 in. by 3 in. by 3 in. by 19·37 lb. channel riveted through one flange to the $\frac{7}{16}$ in. skirting plate at a distance of 1 ft. 6 in. above the bottom of the lift, where there is a 5 in. by 5 in. by ¾ in. steel angle, the vertical flange of which is riveted to the skirting plate. To the bottom flange of this angle is riveted a 10 in. by ¾ in. steel plate, which is attached to the outer flanges of the channel above by 5 in. by ½ in. flats at about 4 ft. 7 in. centres. To this channel is also secured the ends of the outside stiffening channels of the vertical stays, which extend inside 1 ft. 3 in. below the bottom of the lift. The lower ends are each secured to the ¾ in. plate of the bottom curb through a pair of pressed-steel brackets riveted back to back. The rolled sections forming this curb are provided with internal joint covers bent to the shape of the section, and the ¾ in. plate has a single joint cover.

(To be concluded.)

POWER TRANSMISSION BY WAVE VIBRATIONS AND THE STORAGE OF ENERGY IN LIQUIDS.

The discovery made by Gogu Constantinesco, that it was possible to employ wave motions or pulsations set-up in an enclosed column of liquid to transmit power, has apparently now been developed into a practical and commercial proposition by Messrs. Walter Haddon and Gogu Constantinesco, and is being considered by engineers when deciding the best method of power transmission. One of the most prominent and important applications which it has found was during the war, when it was applied to aeroplane machine gun synchronizing interrupter gear, for which a claim has recently been heard by Mr. Justice Sargeant, Chairman of the Royal Commission on Awards to Inventors.

Wave transmissions can be applied in practically all instances, as it is possible to transmit simple reciprocating motion or rotary motion. As far as simple reciprocating motion is concerned, this method of transmitting power has been well tested in the mining industry, for the working of rock drills, &c., and has been proved very efficient and economical. Possibilities in this direction are fairly great—for example, it can be applied to pile driving, rivet hammers, caulking chisels, pumping, hoists, &c. Wave transmission has also been successfully used in actuating the fuel inlet and exhaust valves, in lieu of valve rods, rocking levers, and other mechanism, on the large Diesel engine of a warship.

The application is also equally large where rotary motion is required—for instance, it can be employed in place of shafting and belts in a machine-shop. In this case a separate motor is installed on each machine. A wave rotary motor can also be applied to traction.

As far as the gas industry is concerned, the application of transmitting power by wave vibration is without doubt well worth consideration in many instances—viz., as far as portable tools are concerned; and it might well be utilized for the caulking of lead joints on gas-mains.

Although the transmission of power in this way is as yet in its infancy, there is promise of a great future before it; and the possibility of its application should be seriously considered by all progressive engineers. A treatise on "Wave Transmission through Matter" by the inventor, G. Constantinesco, can be obtained from Mr. Walter Haddon, 132, Salisbury Square, E.C.4, price 10s. 6d. net.

Heat Flow in Coal.—In connection with a study of the flow of heat in coal being made by the United States Bureau of Mines at their experimental coal mine near Pittsburgh (Pa.), the problem of determining the rate of flow of heat from the ventilation air into the coal at the experimental mine has been attacked by making use of a standardized flow plate inlaid in the coal walls of the mine. This plate consists of a sheet of lead ¾ in. in thickness and 3 ft. in diameter. Thermocouples mounted in the opposite faces of this plate enable the operator to determine the temperature gradient across it, and, knowing the thermal conductivity of the lead, the quantity of heat flow into or out of the coal follows immediately. The conductivity of the coal is also computed by using these data, together with the temperature gradient in the coal. This gradient is found by means of a large number of thermocouples which are located at various positions in the mine wall.

THE SCHEME FOR THE FUTURE EDUCATION AND EXAMINATION OF THOSE ENGAGED IN THE TECHNICAL WORK OF THE GAS INDUSTRY.*

By WALTER HOLE.

Some few years hence, in looking back, it will probably be generally admitted that no greater service was ever rendered to the cause of the education of the youth of the gas industry than the action taken about four or five years ago by the Board of Education in relation to "outside" examination of Technical Institute students. This action caused a considerable amount of disquiet and uneasiness at the time among those who had been conspicuous in their devotion to technical instruction in relation to the gas industry; but it had the effect of directing attention to, and challenging a solution of, problems which had been allowed to remain in the background far too long. There had been no imperative need for their immediate consideration; and whenever that is true of any question, there is always a host of other matters which will thrust it aside. The action of the Board forced the question to the front, and became the starting-point for what one hopes and trusts will prove a most salutary change in the attitude of the industry to the education of its young men.

Up to the present the Institution of Gas Engineers have taken no direct part in this question of technical education, beyond that of providing from among its members from time to time those who were prepared to sacrifice hard-earned ease and leisure to frame the questions for, and subsequently mark the papers worked in connection with, the examinations organized by the City and Guilds of London Institute. Under the scheme which is now being considered, the Institution becomes a great partner in this matter of technical instruction in gas subjects. In co-operation with the Board of Education, it assumes responsibility for the courses of instruction, and the examination of its students. It will issue its own certificates to successful students. It must be satisfied as to the equipment of the Institutes, the qualifications of the teachers, and the curriculum and syllabus of instruction, and will even exercise considerable control in the matter of "inside" examinations. At the other end of the scale, it becomes an examining body pure and simple, and for the first time arranges a scheme of certification by examination of such an advanced type as shall make the certificate one of the greatest practical value and correspondingly coveted. In connection with this diploma examination, provisions have been adopted to stimulate independent thought in the student, which must in the long run react to the great advantage of the industry as a whole.

The scheme may be viewed from the standpoints of the student or of the control and management, or both. In relation to the former, the scheme is very simple. Section I. deals with the student who is in the fortunate position of being able to attend classes in gas subjects at an approved Technical Institute. On leaving school at the age of 15 or 16 years, such a student would commence a three years' course. The first two of these years would be devoted to elementary science subjects which are directly connected with his main subject. For the gas engineering course, it would be necessary for the student to choose whether he would concentrate on chemical or engineering subjects. Having chosen his course and completed two successful years' work in it, he would proceed in the third year to a study of gas engineering or gas supply. The examination for the first, or ordinary, certificate will be an "inside" one—that is to say, it will be conducted by the teacher of the class. Of the danger of this, mention will be made later.

Having successfully negotiated his first hurdle, the student will next proceed with a further two years' course of more advanced study, more or less along the lines of the ordinary course, but with greater elasticity in choice of subject, should such be deemed desirable. At the close of this course, the student will be entitled to sit for examination for the higher certificate. In both the ordinary and higher sections the Institution of Gas Engineers will issue certificates to successful students, signed by the President for the time being and the Secretary of the Institution. These certificates will be endorsed by the Board of Education, and also indicate the measure of success attained in the cognate subject taken.

The control and management of the courses of study and subsequent examination will be vested in an Advisory Committee, consisting of members of the Institution of Gas Engineers, representatives of the Junior Gas Associations, and representatives of the Board of Education. Subject to instruction from the parent bodies, this Advisory Committee will have wide powers of control, and will be able to introduce any alteration or modification of the scheme which experience may prove necessary. The Board of Examiners will consist of three each in gas engineering and gas supply, who will set the questions, mark the papers in the examinations for the higher certificate and diploma, and also conduct the oral portion of the latter examination.

It is, of course, no use whatever to impose any such scheme as this upon the Principals of Technical Institutes from the outside. Such a step might be met by acquiescence, but nothing more. For success, we want much more. We want hearty, earnest, and sincere co-operation. If this is to be secured, the teacher's voice must be heard. The scheme provides for this by setting up a Consultative Committee, consisting of members of the Advisory Board and representatives of the teachers, who shall meet at least once a year to consider matters arising out of the practical working of the scheme. This meeting will include members of the Board of Examiners, so that any matters mutually agreed upon may be adopted without delay.

The peril of the "inside" examination is a very real and important one, and caused the authors of the scheme much serious and anxious thought. A moment's consideration will convince anyone that, if the teachers of gas subjects are to examine their own students, the certificates gained would be useless for comparative purposes, inasmuch as each teacher would adopt his own standard, and it might happen that there was a great disparity between the highest and the lowest. After all, candidates do not sit for examination for the fun of the thing; it is because a certificate has real bread-and-butter value. But where there is lack of uniformity, and therefore of comparability, the value is largely decreased, as the tendency always is, in such cases, to degrade all to the level of the lowest standard. In order to avoid these manifest dangers, provision is made under the scheme for the appointment of Assessors, whose duty it shall be to exercise control over the questions set and confirm the subsequent marking of the papers. In this way it is hoped that at any rate a rough degree of uniformity may be obtained. Fortunately, this difficulty is confined to the examination for the first, or ordinary, certificate, inasmuch as the questions set in the subsequent examinations will be framed by the examiner appointed by the Institution of Gas Engineers, and who will also mark the worked papers.

The student in sparsely inhabited districts presented a very real difficulty to the framers of the scheme. On the one hand, it is, of course, desirable that all students should undergo a course of instruction by a qualified teacher at an approved Technical Institute. On the other, it is certain that to have insisted on this condition in all cases would have involved the exclusion from examination at all of vast numbers of potential students. It is really surprising how comparatively few of the Technical Institutes throughout the country include gas subjects in their curriculum. On the other hand, instruction in the cognate subjects, general engineering, mathematics, and to a less degree chemistry and physics, is obtainable in, or within comparatively easy reach of, most localities. The scheme therefore provides that any student who can show that he has attained the specified standard of education in the selected sciences, but who has been unable to obtain class instruction in gas subjects, and so has been thrown back upon private study and coaching, if actually engaged in a practical capacity in the industry, may apply to the Secretary of the Institution of Gas Engineers for examination and certification. Such application must be made by Aug. 31, to be available for the examination of the following April or May. The Advisory Committee thereupon will arrange for the examination, for this purpose acting through the District Institutions, who will be asked to make local arrangements for room and superintendence of the examination. The examination will be held on the same day and at the same hour as those under Section I. In the ordinary grade, the questions will be of equal standard, and in the higher grade will be identical with those set for Technical Institute students. The reason for insisting on such a long notice is to give the Board of Education time to arrange for courses of instruction in gas subjects at the nearest Technical Institute during the following winter season, wherever the number of students in any locality applying for examination, and thus revealing the need, would be sufficient to warrant them in that course. It is hoped that in this way the number of Institutes teaching gas subjects will be gradually extended until, in the course of a few years, they cover practically the whole country.

The crown of the whole scheme is the Diploma Examination and certificate. This examination, being intended for those qualifying for the highest positions the industry has to offer, will be of a correspondingly high standard. The number of students desiring to undergo examination at any one time, and from any one locality, must inevitably be too small to justify any Technical Institute in arranging courses of study of such an advanced character. Students of this class will therefore be dependent on private study and coaching, *plus* practical experience in the course of their daily duties, for their instruction. The examination will be partly written and partly oral. The syllabus for the written portion will be published in due course, and will be of a very advanced character. The oral portion is designed to eliminate the mere book-man by bringing him face to face with examiners who will quickly be able to prove the extent of his practical acquaintance with his subject. It will also provide some measure of counterbalance for the man who, while fully and practically acquainted with his subject, is not always happy in expressing himself in a written paper.

Three other new features are introduced into this examination. It is strongly held by many that anyone aspiring to fill high and important administrative positions in the industry should have all-round knowledge. The scheme therefore provides that, before

* The Education and Examination Scheme was published in last week's "JOURNAL," p. 287.

any student may sit for the Diploma Examination, he must be in possession of the higher certificate in *both* Gas Engineering and Gas Supply. Whether the Diploma sought and granted be in Supply or Engineering, its possession will imply a good all-round knowledge of the industry on its technical side. Again, before examination, the student must have written an original thesis on some subject connected with his work. For a Gas Engineering student, this may be a paper on some point of gas-works construction or practice, and for a Gas Supply student may be a consideration of some aspect of distribution or utilization of gas. The importance of this will be at once apparent. It will tend to stimulate independent thought. The bending of fresh, young minds, untrammelled by tradition, and too young to have acquired ruts, to the problems of daily work and experience, must inevitably be of great advantage personally, and must also in course of time react to the inestimable advantage of the industry as a whole. Thirdly—perhaps in natural sequence it ought to have been placed first—the scheme rightly insists that, before examination for the Diploma, a certain minimum standard of general education shall have been attained by the student. This has been fixed at the not very exalted level of the matriculation certificate of the Northern, Midland, or London Universities, or the Higher School Certificate A or B, or their equivalents. Considering that these are usually taken by the youth of 15 or 16 years of age in our secondary schools, it cannot be said that the standard has been fixed unduly high.

Such is the scheme which the members of the Institution of Gas Engineers will consider at the special meeting to be called in February next. It provides, as has been seen, for the co-operation in this business of two great bodies. The Board of Education brings as its contribution the Technical Institutes of the country, with their equipment and teaching staff; while the Institution of Gas Engineers brings its intimate knowledge of the needs of the industry, of the goal to be aimed at, its syllabuses detailing subjects of study, the framing of suitable questions for the examination, and the marking of the script after the examination has been held. In such co-operation the future instruction and examination of the youth of the industry may proceed in full confidence of attaining a worthy and desired end. This, however, is merely the expression of a personal opinion. It will be for the Institution to say whether or not the scheme meets the immediate needs of the industry, and whether it is of such a character as to be readily adapted to the changing needs of the times and capable of such modification as experience may show to be necessary. Does the scheme provide a means by which the youth of exceptional powers, whatever his original circumstances may have been, may reach the highest certification which the industry offers? Is the scheme in its broad features worthy of support? If the writer's experience in visiting the various District Institutions may be taken as indicative of the final decision, there can be little doubt that the verdict of the industry will be overwhelmingly favourable, even if not unanimous.

APPLICATION OF TOWN GAS TO GALVANIZING AT THE NACTON WORKS OF CRANE-BENNETT, LTD., IPSWICH.

[Contributed by JOHN H. BARTLETT, Jun.]

THOSE connected with the sale of gas for industrial purposes will no doubt be interested in a description of an installation recently made at the Nacton Works, near Ipswich, of Messrs. Crane-Bennett, Ltd., which is believed to be the first application of town gas in this country as fuel for quantity galvanizing. This is a heating operation for which gas offers many important advantages; and when high rates of production are to be dealt with, it has been found not only cleaner and more easily controlled, but actually much cheaper in operating expense per ton of metal coated. Galvanizing furnaces use gas most, if not all, of the 24 hours; and as the rate of consumption is fairly constant, this is a valuable kind of industrial business for gas undertakings.

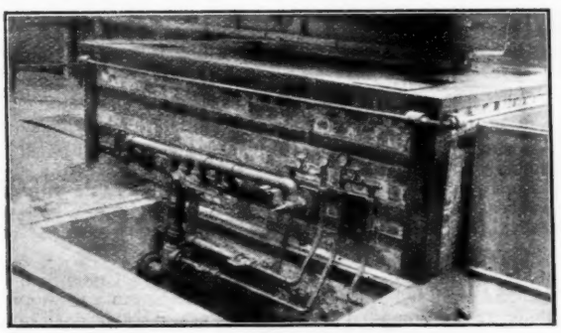


Fig. 1.—The Galvanizing Bath.

Messrs. Crane-Bennett, Ltd., closely connected with the important Crane Companies, are now completing a large model factory at Ipswich for the manufacture of their standard products. As a considerable part of the output of pipe fittings is galvanized ware, a complete plant has been installed for this operation, including tumbling barrels, pickling and washing vats, drying pans, and galvanizing bath. Material is conveyed progressively from one operation to the next by a convenient overhead monorail system, and special care has been taken to ensure thorough ventilation by the discharge of all fumes through exhaust ducts served by a powerful fan.

GALVANIZING FURNACE.

The galvanizing bath (which is illustrated in fig. 1) is 6 ft. long by 2 ft. wide by 3 ft. deep, inside dimensions. The tank is of 1¼ in. steel plate, bent to U shape, with ends let into the brickwork of the furnace, which is securely stayed and tied to ensure against leakage of metal. The furnace is built of firebrick and red bricks round the tank, with heavy steel members to resist the lateral thrust of the molten zinc, reinforced with cast-iron corner clamps and tie-rods. Steel cover plates are provided over the top of the furnace to protect the brickwork when working.

Details of the furnace construction and the method of firing are shown in fig. 2. Zinc dross, being heavier than zinc, sinks to the bottom of galvanizing baths, and forms a thick insulating layer, which makes it impracticable to apply heat to the bottom of the tank without blistering and burning it rapidly. The practice in coke-heated galvanizing furnaces is, therefore, to have the fireboxes at the sides of the tank, which rests on a solid sand-filled bottom; and the same method is followed with gas fuel. The fact that heat can only be applied to the tank above the dross level makes it essential that the small surface which is available for heat absorption should be utilized with the greatest possible efficiency if high output is to be obtained.

The furnace is equipped with eight Surface Combustion burners

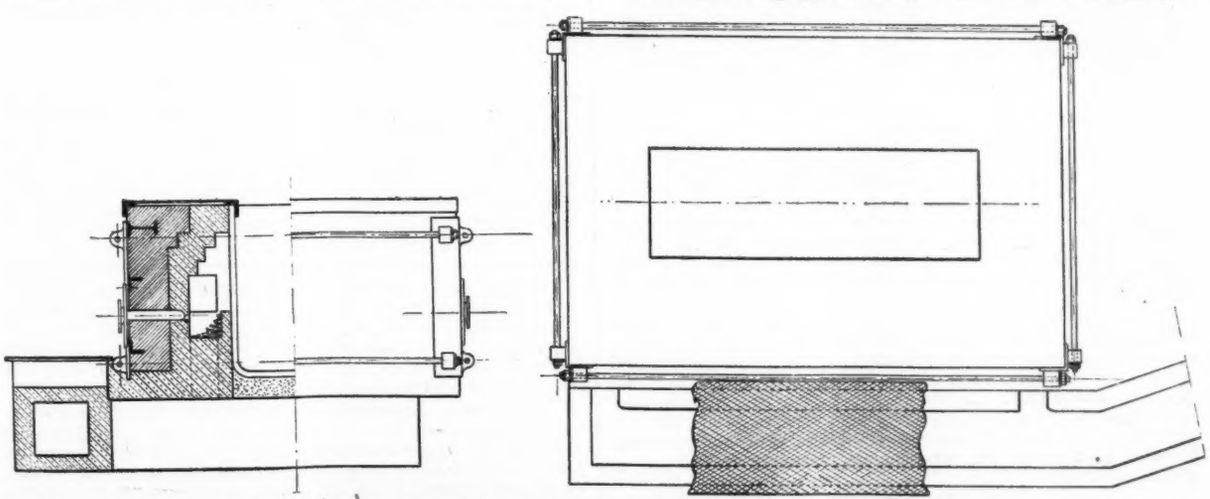


Fig. 2.—End Elevation and Plan—Showing Construction Details and Method of Firing.

of the impact bed type, four on each side of the bath. These are cemented solidly into the brickwork, and discharge the gas ready mixed with the correct amount of air for combustion into beds of loose refractory material. Here combustion is complete and practically instantaneous; the refractory rapidly becoming incandescent. The sides of the tank are heated by radiation and by the hot products of combustion passing from these beds. It will be noted that the tank is protected from direct impingement of the burning mixture by baffle tiles, and that the burners and combustion pockets are placed so as not to heat the bath below the normal dross level. Lighting and inspection holes are provided between the burners.

The burners are connected in groups of four to Surface Combustion high-pressure inspirators, through which gas, under pressures up to 10 lb., is made to entrain from the atmosphere the correct amount of air for complete combustion. These inspirators ensure thorough mixing of the gas and air, and automatically maintain the proper ratio between them, without excess of either. The gas consumption and temperature of the furnace may be controlled by a single throttle valve on the gas line, without any attention to burner regulation on the part of the operator. This simplified control has been found of considerable advantage in galvanizing work, as it leaves the furnace men entirely free for production work.

From the combustion chambers the waste gases are led down into a refractory lined flue below floor level, which carries them to a set of three cast-iron drying pans, each 3 ft. by 3 ft., on which the fittings to be galvanized are thoroughly dried before immersion in the bath, so as to avoid dangerous spattering of molten zinc through sudden steaming. The drying furnace is shown in the background in fig. 3. Auxiliary burners with high-pressure inspirators are provided under the pans to bring these quickly up to temperature after shut-down, and for extra heavy loads. A steel chimney at the further end of the drying furnace discharges the waste gases from the two furnaces above the roof of the building.

NIGHT OPERATIONS.

It is the practice with galvanizing tanks of this type to keep the bath slightly above melting-point during the night shift. While the burners may be shut-off for some hours after the finish of the day's work, they are lit about the middle of the night, and run at low rates until an hour or two before the arrival in the morning of the day shift, when full power is turned on to bring the bath back to operating temperature in time for the beginning of work. Owing to the arrangement of the compressor drive at the Nacton works, it would have been necessary to run all the shafting in this shop to operate the gas-booster at night, but for the fact that there is a powerful air-compressing plant available, with large receiver capacity; and it was decided to utilize this to run the burners during the night shift. For this purpose, additional air-gas inspirators using blast air at 1 lb. and gas at ordinary main pressure were installed in such manner that either high-pressure gas or air blast could be used with the same burners; the set of inspirators not in use being closed-off from the burner manifold by cocks provided for the purpose. In order more efficiently

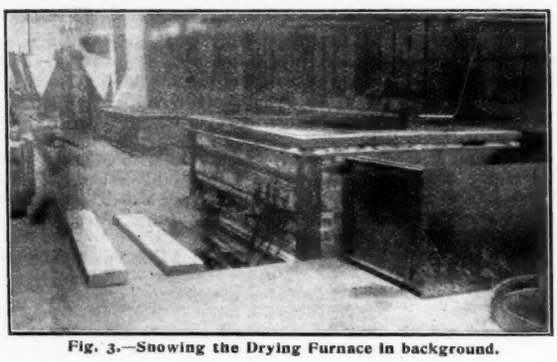


Fig. 3.—Showing the Drying Furnace in background.

to utilize the store of compressed air, the air inlets of the low-pressure inspirators were equipped with additional small inspirators of the high-pressure type, in which a small amount of compressed air at 50 to 60 lbs. pressure is used to inspirate several times its own volume of atmospheric air, delivering a large quantity of low-pressure air at 1 lb. pressure to the standard mixing inspirators. These appliances thus save about 75 p.ct. of the compressed air which would be required if ordinary throttle-reducing valves were employed, and pay for themselves in a very short time.

Because of this requirement of alternative operation on either high-pressure gas or compressed air and low-pressure gas, the inspirators and connections on this furnace are more complicated and occupy much more space than on the usual surface combustion galvanizing tank. On the working side of the furnace they are lodged, therefore, in a pit below floor level, covered with steel plating, leaving only the control valve and gauges above floor level. Fig. 1 shows the arrangement of piping with covering plates removed.

GAS-COMPRESSOR.

While surface combustion high-pressure gas equipment will operate satisfactorily with gas at pressures as low as 1 lb., it is desirable to have available a greater pressure, to provide the wider range of control in output and temperature sometimes demanded of a galvanizing plant. To supply gas to the mixers, a small high-pressure compressor is installed (as shown in fig. 4). These machines offer for such work the important advantages of freedom from overheating or breakdowns and extremely smooth running. The compressor installed is equipped with gas bye-pass, pressure-regulating valve, and a water-separator; and it

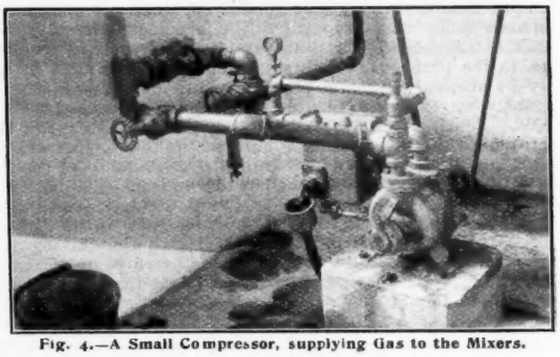


Fig. 4.—A Small Compressor, supplying Gas to the Mixers.

operates at 1750 r.p.m., maintaining a constant supply at 10 lbs. pressure with complete absence of pulsation. The power consumption with this system is about the same as for an air-blower at 1 lb. pressure, and of equivalent burner capacity. Fig. 4 shows the compressor driven by belt; but this was only a temporary measure, and the compressor is now driven by separate motor by means of a short silent chain.

ADVANTAGES OF GAS.

Gas offers many important advantages over coke for heating galvanizing baths wherever quantity production is required. Not only does gas greatly improve working conditions, eliminating smoke and fumes, but the absolute control of temperature and uniform application of heat obtained by its use often result in a great reduction in costs. In the first place, it is possible with a gas-fired furnace to increase production as much as 50 p.ct. over that obtainable with a coke-fire, without damage to the tank or any decrease in its life. In fact, the life of gas-fired tanks is usually much longer than coke-fired tanks, for when a coke-fire is forced there are always spots which are much hotter than the rest of the fire-box, and at these points the tank is subject to rapid corrosion.

A considerable decrease in the percentage of dross formed has also been noted in the case of gas-fired tanks, due to the absolute control (within + 5°) which is readily obtainable with gas-furnaces. The saving in labour for stoking, cleaning fires, ash removal, coke handling, &c., is, of course, obvious.

FUEL CONSUMPTION.

It is regretted that as the factory of Messrs. Crane-Bennett, Ltd., has not yet been put in operation, no figures are yet available on gas consumption per ton of fittings galvanized, although the bath has been fired and initially melted-down. To maintain a working heat of 850° Fahr. in the empty bath, about 300 to 325 c.ft. per hour are required. When holding-down during the night shift at a temperature of about 790° to 800° Fahr., this consumption will fall to round 240 c.ft. per hour.

The gas required under working conditions will, of course, depend largely upon the rate at which fittings are coated; fuel costs per ton fall rapidly as production is increased up to maximum capacity, which on this size tank is about 5 to 6 tons per nine-hour day. At this rate the gas consumption is estimated at between 800 and 900 c.ft. per hour, including the gas necessary to heat and melt about 10 cwt. of fresh spelter per day. The above figures refer to town gas of 480 B.Th.U. gross.

The furnaces described in this article were installed by British Furnaces, Ltd., of Chesterfield, under patents of the Surface Combustion Company, of New York.

The writer wishes to acknowledge his indebtedness to Mr. C. H. Taylor, Works Manager of the Ipswich plant of Messrs. Crane-Bennett, Ltd., for his kind permission to publish the information and photographs contained in this article, and to express his appreciation of the many courtesies extended to him during the installation and initial testing of the plant.

Institution of Heating and Ventilating Engineers.—There is to be a meeting of the Institution on Friday at the Engineers' Club, Coventry Street, W., when Mr. M. Kinoshita, M.Sc. (of the Department of Heating and Ventilating Engineering, University College), will submit a paper on "Instruments for Heating and Ventilating Engineers."

Illuminating Engineering Society.—The opening meeting of the new session will be held at the Society of Arts at 8 o'clock on Tuesday, Nov. 14, when reports on progress during the vacation and developments in lamps and lighting appliances will be presented, and some interesting novelties (new portable instruments for testing illumination, lighting fittings, illuminated signs, &c.) will be exhibited.

LOW-TEMPERATURE CARBONIZATION AND THE THERM.

By WALTER CHANEY.

THE method of charge by the therm introduces two measurements—volume and quality; the predominating basis in the formation of the therm being the quality.

	By Meter Registration.
1000 c.ft. of 400 B.Th.U. .. 4 therms at 1s. per therm ..	4s. per 1000 c.ft.
1000 c.ft. of 800 B.Th.U. .. 8 therms at 1s. per therm ..	8s. per 1000 c.ft.

Dismissing the volume from one's mind, the financial aspect by the adoption of low-temperature carbonization as an auxiliary has important advantages both in the cost of production and in the consumption of coal.

To the consumer the all-important point is the cost of the therm, the quality being guaranteed under the Gas Regulation Act, and to the gas engineer the utilization of the manufacturing plant to meet the demands of the consumer and the requirements of the Act. The following instances illustrate the application of gas of 750 B.Th.U. per c.ft. from low-temperature carbonization as an auxiliary in ordinary gas-works practice.

Gas Undertaking "A." Supplying Straight Coal Gas. 180 Million C.Ft. per Annum.

Declared calorific value of town supply	490 B.Th.U. per c.ft.
Cost of gas into holder	8d. per therm
Therms obtained per ton of coal carbonized	70
Total therms made per annum	880,000
Total coal carbonized per annum	12,571 tons

With low-temperature gas as an auxiliary, introducing 23 p.ct. of blue water gas.

Coal gas of	490 B.Th.U.	per c.ft.
Blue water gas of	300 B.Th.U.	,,
Low-temperature gas of	750 B.Th.U.	,,

60 p.ct. of coal gas of	490 B.Th.U.	= 294 B.Th.U.	Town supply of 490 B.Th.U.
23 p.ct. of blue water gas of	300 B.Th.U.	= 69 B.Th.U.	
17 p.ct. of low-temperature gas of	750 B.Th.U.	= 127 B.Th.U.	

Cost of existing supply	8d. per therm.
Cost of blue water gas	4d. per therm.
Cost of low-temperature gas	9d. per therm.

Gas.

60 p.ct. of coal gas at 8d. per therm	4·8d.
23 p.ct. of blue water gas at 4d. per therm	0·9d.
17 p.ct. of low-temperature gas at 9d. per therm	1·5d.
Cost of 490 B.Th.U. town gas	7·2d. per therm.
Original cost of gas	8·0d. per therm.
Cost of mixture	7·2d. ,,
Saving	0·8d. per therm.
880,000 therms at 0·8d.	£2933.

Coal and Coke.

Yield from ordinary gas plant, 14,400 c.ft. of 490 B.Th.U. p. ton.	70 therms per ton of coal carbonized.
Yield from blue water-gas plant	156 therms per ton of coke.
Yield from low-temperature gas plant, 8000 c.ft. of 750 B.Th.U. per ton	60 therms per ton of coal carbonized.

1000 c.ft. of 490 B.Th.U. (4·9 therms)		Therms.
	60 p.ct. from coal gas =	2·94
	14 p.ct. from water gas =	·69
	26 p.ct. from low-temp. gas =	1·27
		4·90

Total therms per annum, 880,000.

60 p.ct. of 880,000 therms	528,000 ..	7543 tons of coal.
14 p.ct. of 880,000 ,,	123,200 ..	790 tons of coke.
26 p.ct. of 880,000 ,,	228,800 ..	3814 tons of coal.
	880,000	

Total coal carbonized	12,571 tons.
Coal by mixture	11,357 ,,
Saving of coal per annum	1,214 ,,
Additional coke used for blue water-gas making	790 tons.
1214 tons of coal at (say) 40s. per ton	£2428
790 ,, coke at (say) 35s. per ton	£1382
Saving	£1046
Saving on gas into holder	£2933
Saving on cost of coal	£1046
Total saving	£3979 per annum.

In this instance, the cost of low-temperature gas could have been increased to 14d. per therm before the original price of 8d. per therm was overtaken, the saving of coal remaining as above.

Gas Undertaking "B." Using Large Quantities of Oil for Carburetted Water Gas.

Using 33 p.ct. of carburetted water gas.

Declared calorific value	475 B.Th.U.
Total coal carbonized	1,836,935 tons per annum.
Total oil used	14,132,779 gallons.
Value of oil	£515,518
Cost of production	8·31d. per therm.
Therms obtained per ton of coal carbonized	63·5
Calorific value of coal gas made	520 B.Th.U.
Total therms made	158,857,081.

Low-Temperature Gas, Cutting-out the Use of Oil and Retaining 30 p.ct. Blue Water Gas.

60 p.ct. of coal gas at	520 B.Th.U.	= 312 B.Th.U.	Town supply of 477 B.Th.U.
30 p.ct. blue water gas at	300 B.Th.U.	= 90 B.Th.U.	
10 p.ct. low-temp. gas at	750 B.Th.U.	= 75 B.Th.U.	

60 p.ct. of coal gas at 8·31d. per therm	4·98d.
30 p.ct. of blue water gas at 4d. per therm	1·20d.
10 p.ct. of low-temperature gas at 10d. per therm.	1 00d.
own gas of 477 B.Th.U.	7·18d. per therm.
Original cost of gas	8·31d. per therm.
Cost of mixture	7·18d. ,,
Saving	1·13d.

	£
158,857,081 therms per annum at 1·13d.	747,952
Value of oil used	514,518
	£1,262,470

In this instance the low-temperature gas could have been valued at 21d. per therm before overtaking the original cost of 8·31d. per therm.

Coal and Coke.

The coke required for blue water gas was common to both systems.

1000 c.ft. of 477 B.Th.U. per ton = 4·77 therms		Therms.
	65·4 p.ct. from coal gas =	3·12
	18·9 p.ct. from water gas =	0·90
	15·7 p.ct. from low-temp.gas =	0·75
		4·77

65·4 p.ct. of 158,857,081 therms	= 103,892,531	therms	coal gas (coal).
18·9 p.ct. ,, ,,	= 30,023,988	,,	water gas (coke).
15·7 p.ct. ,, ,,	= 24,940,562	,,	low-temp. gas (coal).
	158,857,081	,,	

		Tons.
103,892,531 therms at 63·5 therms per ton of coal carbonized		1,636,102
24,940,562 ,,	at 55 ,, ,, ,, ,,	453,465
7300 c.ft. of 750 B.Th.U.	adjusting for therms obtained from coal—*i.e.*, 63·5	
Total coal by mixture		2,089,567

Original coal carbonized	1,836,935 tons
Coal by mixture	2,089,567 ,,
Extra coal	252,632 ,,

Saving on gas	£747,952
,, oil	514,518
	£1,262,470
Extra coal at (say) £2 per ton	505,264
Total saving	£757,206

Gas Undertaking "C." Small percentage of Blue Water Gas used. Increased by Low-Temperature Gas to 22 p.ct.

Blue water gas made	7 p.ct.
Gas into holder	6·56d. per therm.
Coal carbonized	831,735 tons.
Declared calorific value	495 to 500 B.Th.U.
Calorific value of coal gas made	520 B.Th.U.
Therms made per annum	44,824,502
Therms from coal per ton	60

Gas.

67 p.ct. coal gas of 520 B.Th.U.	= 348 B.Th.U.		Town supply of 497 B.Th.U.
22 p.ct. blue water gas of 300 B.Th.U.	= 66 B.Th.U.		
11 p.ct. low temp. gas of 750 B.Th.U.	= 83 B.Th.U.		

67 p.ct. coal gas at 6·56d. per therm	4·39d.
22 p.ct. blue water gas at 4·00d. per therm	0·88d.
11 p.ct. low temp. gas at 7·5d. per therm	0·82d.
Cost of 497 B.Th.U. town gas per therm	6·09d.
Original cost	6·56d. per therm.
Combined cost	6·09d. ,,
Saving	0·47d. per therm.

44,824,502 therms per annum at 0·47d. = £87,781.

Coal and Coke.

Total therms, 44,824,502.

1000 c.ft. of 497 B.Th.U. = 4 97 therms.		Therms.
	70 p.ct. from coal gas =	3·48
	13·3 p.ct. from water gas =	0·66
	16·7 p.ct. from low-temp.gas =	0·83
		4·97

70 p.ct.	44,824,502 therms	= 31,377,151 therms	coal-gas plant
13·3 p.ct.	44,824,502 ,,	= 5,961,658 ,,	blue water gas (coke)
16·7 p.ct.	44,824,502 ,,	= 7,485,692 ,,	low-temp. gas plant
31,377,151 therms at 60 therms per ton			522,952 tons
7,485,692 ,, ,, 50* ,, ,, ...			149,714 ,,
Total coal by mixture			672,666 tons

* Note—50 therms to adjust for the 60 therms obtained rom coal.

Original coal	831,725 tons
Coal by mixture	672,666 ,,
Saving	159,069 tons
Coal—159,069 tons at (say) 38s. per ton	£302,232
(Less 5,961,650 therms from water gas at 156 therms per ton of coke, 38,215 tons.)	
38,215 tons coke at (say) 34s. 7d. per ton	£66,079
Saving on coal	£236,153
Saving on gas	£87,781
Total	£323,934

The above figures may be altered to suit the circumstances of the method of carbonization—*i.e.*, the percentage of low-temperature gas reduced by increasing the calorific value of the straight coal gas; or where the vertical system is in operation, increasing the yield by steaming in the retorts.

The value placed upon the therm for low-temperature gas in the above figures shows the flexibility of this cost as compared with the apprised value of fourpence per therm mentioned in the Report of the Fuel Research Board. Further, any extra revenue obtainable from the smokeless fuel resulting from low-temperature carbonization has been excluded.

Coke as a Fuel.

Writing in "Combustion," an American publication, a New Jersey power plant superintendent points out that for industrial purposes nut coke and coke breeze will give results equal to those obtained with similar sizes of hard or anthracite coal. Quoting the results of eight months' experience, he says that during this period approximately 20,000 tons of coke have been consumed in his plant. So far as this particular plant is concerned, it has been shown that coke breeze as a boiler fuel is superior to the mixture of anthracite and bituminous coal that had been used for the preceding six years. In 1921 there was consumed as boiler fuel a mixture of this character which included 33 p.ct. run-of-mine bituminous, and the average boiler and furnace efficiency was slightly over 70 p.ct. During the present year, burning coke breeze, the average efficiency has been slightly over 72 p.ct. Hundreds of householders in his section of New Jersey adopted coke as fuel last autumn. They burned it according to instructions, with results that were gratifying, to say the least. In most cases coke equalled anthracite coal ton for ton; but as there was a $3 difference in price in favour of coke, the saving for the average householder was worth while.

A Smokeless City Experiment.

An effort is, as already reported, to be made at once by the Denver Gas and Electric Company to give the world a demonstration of what a true smokeless city is like. It is planned to equip a hundred homes with gas heating apparatus; and when this number is operating satisfactorily, a second hundred will be taken on. The prediction is that by next year gas will be used entirely for heating purposes in Denver instead of coal. The gas will be supplied all the winter at a low cost, as an experiment; and should this be successful, Mr. Henry L. Doherty, the President of the Cities Service Company, of which the Denver Company is a subsidiary, has declared that he will take immediate steps to supply gas for heating the entire city at a rate lower than the cost of coal. The chief conditions governing those finally selected for the first hundred houses will be the location of the residence upon streets where the Company have already established distribution mains, and the degree of adaptability of present heating systems to the use of gas as fuel. In Denver, low temperatures prevail during the winter months. Contracts have already been entered into by the Company for sufficient additional equipment to satisfy the increased demand. Twenty odd years ago, when Mr. Doherty arrived in Denver to take up his new duties with the Company, the undertaking had got into a badly crippled condition, being insufficiently provided with plant and generally unpopular. Troubles came thick and fast; but the turning-point finally arrived, and the finish, instead of being a colossal failure, as everybody had predicted, proved to be a wonderful success. Denver soon had a gas service which was second to none in the country, and had gained a reputation as a "City of Lights."

London and Southern District Junior Gas Association.—Next Saturday afternoon (Nov. 11) members will visit the Waddon works of the Croydon Gas Company, and those intending to take part are requested to assemble at 2.30 at the north entrance to the works. On Friday evening, Nov. 24, there will be a business meeting at the Westminster Technical Institute, at which a paper on "Gas-Meters: Their Construction and Application" will be read by Mr. Albert T. Gilbert, of Nuneaton.

THE HOME OF THE GLOVER-WEST SYSTEM.

The Third Installation of Continuous Verticals at the St. Helens Corporation Gas-Works.

THE gas-works at St. Helens will always occupy a prominent place in the history of coal carbonization for the production of town gas, in view of the fact that there was made the first installation of what is known as the Glover-West system of continuous carbonization. On that first small installation much of the original developing work of the system was carried out. As we look back at those days, and at that installation, we cannot but help admiring the amount of ingenuity and foresight that was embraced in what was done; for though considerable improvements have since been effected in detail, the principle and the general lines of the settings have remained precisely the same.

It was then seen that there were two outstanding features in the system. One was the incorporation of zonal heating, so that, at different successive parts of the retort, the temperatures could be regulated to any degree desired—limited only by the capability of the refractory material to withstand the temperature. Therefore, graduated temperatures could be employed in these vertical retorts just as was considered desirable for any particular class of coal. The other feature was the extraction of the coke in almost a cold condition—thus avoiding, to a very large extent, the breaking-up of the coke, and the drenching of it with water such as obtains in the ordinary method of quenching.

THE PIONEER INSTALLATION.

The original installation was one of eight retorts, 24 in. by 12 in. cross section at the top, and 20 ft. 9 in. long. These were put into operation in October, 1908. We well remember how Mr. John West and Mr. Samuel Glover were not content to put forward to the gas-engineering world their own views upon the working of the process, and the results obtained, without securing perfectly independent testimony. The system was at the time thoroughly inspected and tested by Mr. A. E. Broadberry, the former Engineer to the Tottenham Light, Heat, and Power Company. For this purpose he received his instructions from the Gas Committee of the St. Helens Corporation; and, as a result of his report, the first installation of the Glover-West settings was accepted as being a fulfilment of the contract and the guarantees. Thereafter it will be remembered that exhaustive tests with many classes of coal were carried out by Dr. H. G. Colman; and the results of these tests were freely placed at the disposal of the gas industry.

THE SECOND INSTALLATION.

In passing, as a matter of historical interest, it may be mentioned that the Manchester Corporation placed the second contract with West's Gas Improvement Company for sixteen Glover-West vertical retorts. These were erected at the Droylsden Station, where they remained in continuous operation from July, 1910, for ten years, after which they were reset, and again brought into operation.

In view of the early stage in the history of the system which the construction at Manchester represented, the decade run of those retorts is something of which the inventors and the contractors may well be proud.

ST. HELENS AGAIN TO THE FRONT.

After Manchester, the third installation of the Glover-West vertical retorts to be erected was what came to be known as the No. 2 installation at St. Helens. This was for the time a considerable installation, consisting of no fewer than forty retorts, 30 in. by 12 in. cross section at the top, and 21 ft. 7 in. long. These settings were brought into operation in September, 1911; and they provided a capacity of 1¼ million c.ft. of gas per day.

It should be mentioned here that it was not until 1915 that the first installation of retorts was reset. The eight small ones had been in continuous operation since 1908, and they were replaced by four larger retorts, 40 in. by 8 in. cross section at the top, and 21 ft. long. In these four retorts, much valuable work was done during the war period to establish the new process of steaming in vertical retorts, by means of which some 50 p.ct. was added to the yield of gas per ton of coal; thus rendering considerable service to the nation at a time when it was imperative to conserve to the greatest extent possible all our material resources.

THE THIRD INSTALLATION.

With the 40-in. retorts (which took the place of the original eight retorts) a large measure of success was achieved; and therefore retorts of the same dimensions were adopted for the third installation, which was brought into operation on Aug. 12 last. It comprised 48 of the new standard Glover-West retorts, 40 in. by 10 in. cross section at the top, and 21 ft. long. The installation consists of six settings, each of eight retorts; and the plant has been erected in a house originally built for horizontal retorts.

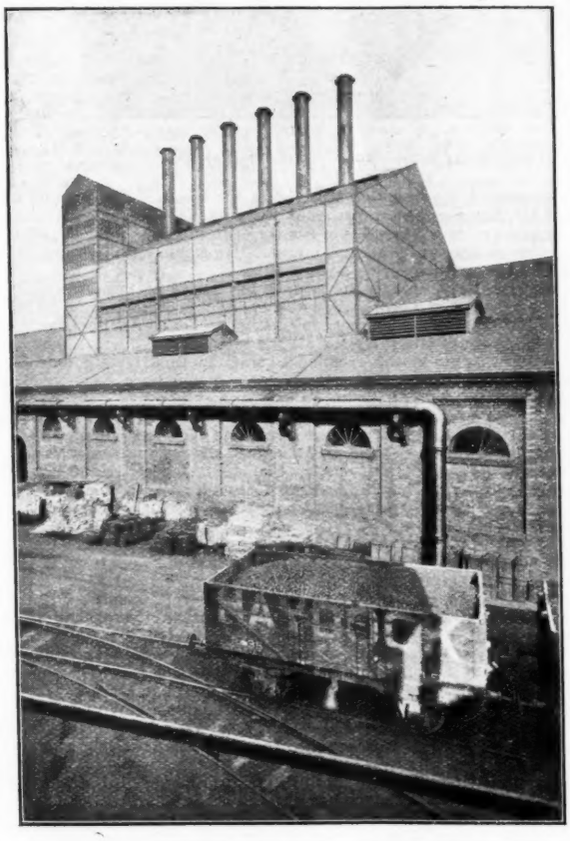
On the existing railway lines, the coal is brought into the coal-store, whence the trucks are hydraulically tipped into a receiving hopper of 10 tons capacity. Below this hopper is a large pit, containing the coal-breaker, feeder gear, and elevator boot. The coal passes from the receiving hopper through the feeder tray to the breaker. It is broken to about 2 in. cube, and then passes into the elevator boot. It is raised by the bucket elevator, and delivered into a push-plate conveyor passing over the length of

the bench. The push-plate conveyor supplies overhead bunkers, which contain twenty-four hours' supply of coal for the retorts.

As an auxiliary to the afore-mentioned coal-handling plant, side-tipping wagons can be filled in the coal-store, run along the narrow-gauge rails to the lift, and there elevated to the bunker level. At this level, rails are provided along the bunkers to enable the wagons to be discharged into them. The coke discharged from the retorts, with the exception of that required for the producers and retort feed, is taken away in barrows to the yard. For the producer feed, the coke is elevated by the lift in bottom-opening wagons, and discharged direct into the producers. For the retort feed, when starting-up and after scurfing, coke is elevated in the lift by the same wagons, and discharged into a storage hopper, whence it is taken to the retort by the overhead runway.

THE COKE HOIST.

This hoist forms one of the novel features of the installation, in that many of the points in construction are new so far as lift practice is concerned. The lift is designed to deal with loads up to 20 cwt., and is used for elevating the coke for supplying the retorts after scurfing operations, and for supplying the necessary coke consumed in the producers. The lift also acts as a stand-by to the coal plant, in that coal may be brought from the coal-store in side-tip wagons along the narrow-gauge rails at the retort-house floor level, and thence elevated in the lift to the bunker level, and the contents discharged into the coal bunkers.



A General View of the Third Glover-West Vertical Retort Installation at St. Helens.

The lift tower is constructed of suitable steel sections, and is provided with collapsible gates at the various levels. The cage is 7 ft. square and 6 ft. 6 in. high, and is also provided with the necessary collapsible gates.

The power for driving the lift is obtained from a vertical gas-engine with suitable reduction and reversing gear, situated at the producer level. Automatic starting gear is provided at the various landing stages, actuated by push-button control. This is the first time that such an arrangement of drive has been installed in connection with a lift. Usually the power is hydraulic, or provided by steam-engine or electric-motor.

After exhaustive trials by Messrs. Mark Webber, Ltd., of Guildford, their 5-9 H.P. vertical gas-engine was modified to meet the requirements of the present instance. The engine was designed originally for continuous running; but due to the intermittent running in the case of a lift drive, unforeseen difficulties presented themselves. The makers adapted themselves to the conditions met in gas-works practice, and supplied the present engine specially to meet them.

The gearing was designed by Messrs. Etchells, Congdon, and Muir, to the instructions of West's Gas Improvement Company, Ltd. Reversal is obtained by two disc clutches rotating in opposite directions. The cage rope, pulled as required, operates one or other of these clutches, at the same time lifting the brake, which automatically comes into operation when the clutches are released. The clutches are Ferodo-lined, and ball races take all end-thrust.

The automatic starting arrangement actuated by electricity is designed on the lines of modern motor-car practice. By means of a special switch, a motor situated alongside the driving gear can be energized from any level, and the engine started-up by simply the pressing of a button. Another button is provided for stopping the engine when the lift is not required. The battery for operating the electric-motor is charged by a dynamo while the gas-engine is running.

A platform at the top of the lift-tower gives ample opportunity for access to the various pulleys for oiling purposes.

THE RETORT-HOUSE.

The retort-house is of the standard steel-framed type filled-in with brick panelling, except at the extension gable, where corrugated asbestos sheeting is used. The floor of the house is finished with granolithic concrete.

The 48 retorts are of the standard Glover-West design, 40 in. by 10 in. They are arranged to be heated in units of four. The principle of heating is still essentially unaltered from that so successfully developed in the earlier installations at St. Helens. The retorts are heated in horizontally disposed combustion chambers; the secondary air being preheated by the outgoing coke. The incoming charge of coal also receives its first supply of heat from the waste gases issuing from the combustion chambers. It will be seen from this that heat efficiency is an important feature of the system. It is believed that such alterations and developments as have been embodied in the present design will conduce to still greater efficiency, economy, and ease of operation.

The whole of the machinery is actuated by gas-engines; there being a 34-H.P. gas-engine for the coal-handling plant, and duplicate 7-H.P. engines for the coke-extractor drive.

On Oct. 26, the Mayor of St. Helens (Mr. R. Ellison) and members of the Council attended at the gas-works, when Alderman James Crooks (the Chairman of the Gas Committee) formally inaugurated the new installation. After the new plant had been inspected under the direction of Mr. F. E. Ward (the Gas Engineer and General Manager), Alderman Crooks said he hoped they would go away feeling satisfied that in the gas estate they had one of the most valuable assets of the Corporation.

Alderman F. J. West presented Alderman Crooks with a handsome silver rose-bowl, suitably inscribed, and in doing so, remarked upon the excellent way in which the St. Helens gas undertaking was controlled. Expressing his gratification at being the recipient of so beautiful a souvenir of the occasion, Alderman Crooks mentioned that he had been Chairman of the Gas Committee for seventeen years.

GLOVER-WEST VERTICALS AT BURY (LANCS.).

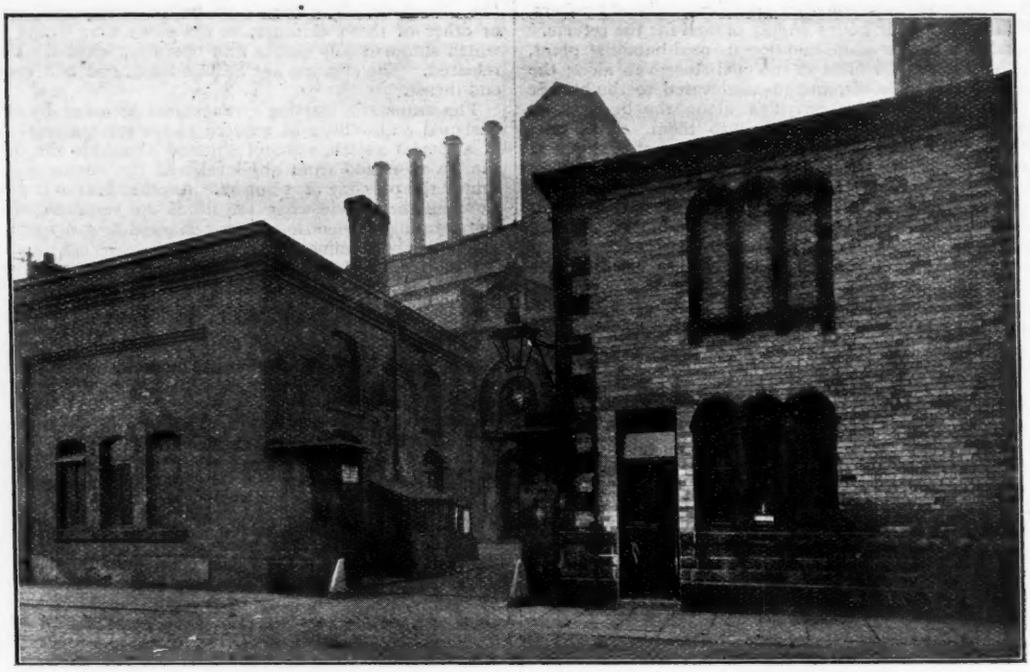
Official Inspection and Inauguration.

There was, on Wednesday, Oct. 25, an official inspection by the members of the Town Council of the gas undertaking of the County Borough of Bury, combined with the inauguration of a Glover-West installation of vertical retorts. The gas-works (of which Mr. Henry Simmonds is Engineer and General Manager) were acquired from a private Company on Jan. 1, 1858, in which year the total quantity of gas made was 55,332,900 c.ft.; while the annual output has now grown to 446,362,000 c.ft.

No. 2 retort-house formerly contained a bench of horizontal retorts, operated by West's compressed-air stoking machinery; and it is at the southerly end of this house that the new Glover-West installation of vertical retorts has been erected. The retort-house wall and gable end have been increased to the required height, and a fresh roof provided for the portion housing the new plant. The installation consists of five beds, or forty vertical retorts for continuous carbonization. Each bed contains two units of four retorts, heated by one producer, and provided with independent chimneys, dampers, and regulators. The nominal capacity of the plant is 1,500,000 c.ft. per day. Not only is this likely to be considerably exceeded, but it has already been demonstrated that the anticipations with regard to an increased yield of gas and residuals per ton of coal carbonized will be fully realized. The extractors are worked by a 5 H.P. "National" gas-engine.

The coke on being discharged from the retorts is removed by a De Brouwer coke conveyor, which conveys it from the retort-house to storage hoppers, railway wagons, or the coke yard, as required. The greater portion of the coke produced is sold in the borough, every effort having been made to develop its sale by supplying in bags any quantity from 1 cwt., and also making it suitable for various trades by cutting it to nut size. Any coke not required locally is loaded direct into railway wagons.

Coke required for the producers is taken up the lift in special coke barrows provided with bottom doors for discharging into the bunker. This is arranged also to fill the retorts when starting-up a bed, or a retort is let-down for scurfing. The bunker is provided with a long shoot supplying coke to a travelling skip, which feeds the producers every four hours.



Entrance to the Bury Corporation Gas-Works, with the Glover-West Retort-House in the Background.

Each bed is provided with a separate gas collecting main, complete with take-off pipes and valves, from each retort. An 18-in. diameter foul main, constructed of light steel plates, and extending the full length of the retort-bench, takes the gas from each collecting main. This is fitted with valves for the independent working of each bed of retorts.

Two 14-in. diameter Parkinson & Cowan retort-house governors are provided, complete with inlet, outlet, and bye-pass valve connections. Below the governor is the tar seal-pot. For access to the various platforms and stages an electric lift is provided, capable of raising a net load of 20 cwt. at a speed of 70 ft. per minute. It is also used for elevating coke.

In beds "C" and "D" steam superheaters are installed at the base of the chimney, and just above the main dampers. The object of the superheaters is to recover heat from the waste furnace gases, and transfer it to the retort in the form of superheated steam. The inlet temperature of the steam is 260° Fahr., and the outlet 700° Fahr. Bed "E" is fitted with a waste-heat boiler so arranged that the waste furnace gases pass through the boiler on their way to the chimney. The boiler is of the water-tube type made by Galloways, and fitted with automatic feed water regulator and low-water alarm. The outlet of the boiler is fitted with a superheater, and the volume of steam generated is sufficient for steaming two beds of retorts. The nominal capacity of the boiler is 250 lbs. of steam per hour.

From the exhausters, the gas passes through Livesey tar-extractors, tower-scrubbers, a Clapham washer, and a Holmes rotary washer. Then the gas is divided into two streams for the two sets of purifiers, each of which comprises six boxes. There are two station meters, and three holders of a combined capacity of over 2 million c.ft.—equal to one day's supply in winter.

The waste gases from the sulphate of ammonia plant saturator pass to a Claus sulphur recovery plant. There is a tar-still capable of dealing with 2000 tons per annum. The chemical laboratory and testing arrangements are of a very complete nature. An experimental plant capable of carbonizing samples of coal under actual works conditions comprises a full-size section of horizontal retort heated by a regenerator furnace, collecting main, foul main, scrubbers, condensers, exhauster, purifiers, meter, and holder. In this apparatus the yield and quality of gas and bye-products from any coal can be readily obtained. The Corporation have their own staff of skilled men for carrying out repairs to the works plant; and the mechanics' shop is well equipped with lathe, drilling machines, punching and shearing machine, power hack-saw, and a blacksmith's hearth, all operated by power derived from a 10 H.P. "National" gas-engine. The joiners' and wheelwrights' shop contains a circular saw driven by electric power. The horizontal engine which operated the air compressor for driving the old West's stoking machinery has been re-arranged to drive an electric generator, which has been installed on the bed formerly occupied by the air compressor. The electric current derived is utilized for working the electric lift and driving the coal elevator, &c.

At the conclusion of the inspection, the company were entertained at dinner in the Derby Hotel—Alderman S. Kay (the Chairman of the Gas Committee) presiding, and giving the Loyal Toast.

Councillor REDFORD proposed "The Gas Committee," with which he associated the name of Mr. Henry Simmonds. He pointed out that Mr. Simmonds took charge of the works in 1899, and within one year brought down the price of gas very considerably. He hoped the installation they were that day inaugurating would help to bring about still further reductions.

Alderman KAY, responding, said he felt proud of the undertaking. The installation of Glover-West vertical retorts brought them right to the forefront in modern carbonizing methods. The contractors had been able to introduce into the plant all the improvements which they had been able to effect by the experience gained in other installations, and he was quite convinced that their money would have been spent to great advantage. The saving in coal alone would be considerable, which was desirable from a national as well as from an individual point of view. It was a great pleasure to him, as one who had been partly responsible for the scheme, to know that the retorts were doing extremely well, and that the results obtained so far were quite satisfactory to both the contractors and the Corporation. He believed that at the end of the December quarter they would be able to make a reduction in the price of gas.

Alderman F. BRADLEY (the Deputy-Chairman of the Gas Committee), who also responded, said he was sure that the work done in connection with the new installation had been carried out in a manner which reflected credit on all concerned with the undertaking.

The MAYOR (Alderman C. Sanderson) replied to the toast of "The Corporation," which had been submitted by Mr. J. L. MERCHANT.

Mr. HENRY SIMMONDS (Engineer and General Manager of the Corporation Gas Department) proposed "The Contractors," who, he said, were represented by Alderman Fred J. West and Mr. Leach. He (Mr. Simmonds) had been associated with the name of West and West machinery practically all his life. Mr. John West (Alderman West's father) was a pioneer in machinery for alleviating the labour of the old hand-stoker. He was the first man to see the advantage of cheapening and saving the cost. Mr. Simmonds referred to the progress and success of "West's machinery," and said he was Mr. West's first pupil when at Maidstone; and when Mr. West came North, he came with him. Referring to the work of Messrs. Etheridge and Leach, he said the foundations showed not the slightest signs of settling.

Alderman FRED. J. WEST (Managing-Director of West's Gas Improvement Company, Ltd.), in responding, said he was pleased to be there at the winding-up of the contract, and to hear the kind words of Mr. Simmonds regarding his father. The man in the street seemed to think that the gas industry was a decaying industry; and many members of town councils thought gas-works were played out, and that there was no future before them. He was prepared to say, as a contractor with experience, that the gas industry was the most fascinating, absorbing, and interesting side of engineering they could have. After referring to the progress of mechanical stoking and vertical retorts, he alluded to the importance of the plant being properly worked. From what he knew of the officials at the Bury Gas-Works, he was sure the plant would be worked properly, and that it would give good results.

Mr. LEACH also responded.

Southern Association of Gas Engineers and Managers (Eastern District).—The next meeting of the Eastern District Section of the Association will take place on Nov. 29, at the Institution of Gas Engineers, No. 28, Grosvenor Gardens, S.W.

Scottish Junior Gas Association Joint Meeting.—A joint meeting of the Eastern and Western District Sections of the Association will be held in Fairley's Victoria Hall, Leith Street, Edinburgh, next Saturday afternoon, when Mr. George Laurie, of Alloa, will read a paper on "The Problems of Condensation." After tea, a smoking concert has been arranged.

THE BRITISH COMMERCIAL GAS ASSOCIATION.

ELEVENTH ANNUAL CONFERENCE AT BRISTOL.

(*Concluded from p.* 304.)

THIS week we conclude our report of the Bristol Conference. In the evening of Tuesday, Oct. 17, the Chairman and Directors of the Bristol Gas Company entertained the President, Vice-Presidents, members, and visitors to dinner at the Victoria Rooms, Clifton. On the Wednesday morning the public conference was continued, which was followed by a return luncheon given by the Vice-Presidents and members of the Association to their President and to the Chairman and Directors of the Bristol Gas Company. This brought to a close a most useful and enjoyable meeting.

DINNER BY THE BRISTOL GAS COMPANY.

The company which assembled at the Victoria Rooms numbered nearly 300, including the Lord Mayor and the Sheriff of Bristol, Lord Riddell, Alderman J. H. Lloyd (the new President), Sir Percy K. Stothert, K.B.E., Mr. W. Doig Gibb, Mr. G. B. Britton, M.P., Sir Arthur Duckham, K.C.B., Mr. D. Milne Watson, M.A., Vice-Chancellor T. Loveday, M.A., Councillor Cundiff (Lord-Mayor Elect of Manchester), Councillor Sir Frank Wills, Alderman J. Fuller Eberle, and Dr. H. W. Russell Bencraft. It was originally intended that Mr. J. H. Howell (Chairman of the Bristol Gas Company) should preside, but he could not attend, owing to ill-health. The chair was therefore occupied by Sir GEORGE DAVIES.

The Loyal Toast having been duly honoured,

Lord RIDDELL (President of the Society of British Gas Industries) in proposing "The City and County of Bristol," said the task of asking the company to drink to the City and County of Bristol was like proposing the toast of the British Empire. In the course of a very amusing speech, he told his hearers how, during the preceding few days, he had devoted himself to a study of the history of Bristol, its many large and historic buildings, its gas-works, and after the gas-works he had come to the lesser monastic foundations! It was one of the great commercial centres in the world, and at the same time a delightful place to visit. He thanked Sir George Davies for his kind hospitality, and the Lord Mayor for having permitted him to perform his very pleasant task. He admired the town. In the name of the Association, he thanked the Lord Mayor and the citizens of Bristol for the wonderful hospitality which had been displayed in the course of the meeting.

The LORD MAYOR, responding, said Bristolians were proud of their city; and it was their greatest pleasure to welcome anyone who was worthy of their welcome, and especially a body of men engaged in such an important industry as the gas industry. In the port of Bristol was collected nearly 25 p.ct. of the whole of the Customs revenue of the United Kingdom. He thanked Lord Riddell for his kind remarks, and the company for the way in which the toast had been received.

Sir ARTHUR DUCKHAM then proposed "The Gas Industry." In doing so, he said that to ask him to propose the toast of the gas industry was like asking him to propose the toast of his own wife, except that he had lived longer with the industry than with his wife! There was the same affection and the same admiration, in a lesser degree. When they thought of the gas industry, they were all proud of being connected with it. Referring to the time of the war, he remarked that it was due to the efforts of the gas industry that the war was able to be continued. They remembered all that those connected with the industry had done, all the vicissitudes they had gone through, in order to provide what was necessary for the explosive and other industries; and they remembered, sometimes with regret, that possibly this great gas industry was less recognized by the Government at the end of the war than any other industry. He knew of no adequate recognition that had ever been given the industry by the Government. Referring to smoke, he said they all knew that gas helped to a very great degree to get rid of it; but they must realize that gas could not, by itself, solve the smoke difficulty. It was up to the gas industry to produce a solid fuel which was smokeless; and he pressed that upon the interests of the industry. The nation relied upon them to provide a suitable fuel that people could burn in their houses without causing smoke; and when they could furnish such great cities as Bristol, Manchester, Birmingham, &c., with such a fuel, then those in authority would lay it down that people should not burn a soft fuel in their grates. He concluded by coupling with the toast the name of Mr. Milne Watson

Mr. D. MILNE WATSON, M.A., in reply, said the industry was no mean industry; it was over 100 years old, and had developed with the times. It had started merely as a lighting organization, had subsequently taken up heating, and Sir Henry Gauvain had shown on the previous evening that there was a greater mission in front of it—viz., the curing of disease and the evils which hung to disease. There were still further triumphs for the industry to look forward to. Those in the gas industry were the first people (leaving out candles) to lengthen the day for work and play; and it was to the gas industry that the whole of modern life owed its development. Until the gas industry started public lighting, the life of the people was an entirely different thing from what it was to-day. The industry had come through many agitations; but he did not think they had passed through a press agitation such as that which they had had recently. Many agitations in the past were infinitely greater than that of to-day. The newspapers in the past had regarded gas as small fry, and rarely referred to it. Now they had discovered that the neighbour's cat was probably more interesting than the fate of nations; hence the industry got, perhaps, more publicity than it wanted. They had sighed for publicity; and now they had got it. The therm agitation was a great mistake in many ways—coming, as it did, from the consumers—because he firmly believed that the therm system of charging was the greatest safeguard that ever had been put before the public, and they only wanted to understand it to appreciate that they had a very much better guarantee that they were going to get what they paid for than they had ever had before. If an inquiry were held—and it seemed possible that it would be held, because he understood that the L.C.C. had decided to ask the Board of Trade to hold an inquiry—he did not think it would be at all a bad thing, because he believed it would be vindicated that the Board of Trade did the right thing when it promoted the Gas Regulation Act. There was no question about the usefulness of gas. Everybody admitted it; and it was only because they did admit it that they were so keen about the therm question. If an inquiry would remove the suspicions that existed, let it come and remove them. He agreed with Sir Arthur Duckham that the industry must give the very best service to the public. Those who administered gas affairs to-day were trustees of a very great industry; and it was up to them to see that they gave that satisfaction which the world looked for from them. The industry would flourish for many a day to come.

COUNCILLOR W. CUNDIFF, in the absence of Sir Wm. Kay (Chairman of the Manchester Corporation Gas Committee) proposed "The British Commercial Gas Association," and complimented the Association on the great progress it had made during the ten years of its existence. He was pleased to know it had its birth in Manchester. It was started with 252 members ten years ago; and to-day he was informed that there were 737, or 84 p.ct. of the gas undertakings of the whole country. He hoped that by next year the remaining 16 p.ct. would have come in, to make 100 p.ct. efficiency. If he had to describe the aims of the Association, he would say they were: (1) Enlightenment; (2) education; and (3) publicity. They wanted publicity to show exactly the appliances to be used, and how gas could be employed, and, above all, to show that gaseous fuel was the best possible fuel to use, in order to do away with smoke. In Manchester they were doing all they possibly could. The Ministry of Health had allocated to Manchester 3000 houses. They were insisting that a four-roomed house should have three gas-stoves, and a three-roomed house two, along with a cooker and a boiler for washing purposes. They were doing their best in Manchester to dispense with smoke as far as possible. They were also going to take their gas-works from the centre of the city. There were three large works in the city and one outside, and, having secured Parliamentary powers, they were going to manufacture gas six miles from the city. The scheme would cost the city six millions sterling, but the new works would be entirely away from any residential property, and could do no harm to anyone in that particular district. When the new works were in operation, the existing ones would be used for distribution only. Speaking of bye-products, he expressed the opinion that gas itself would be a bye-product in time. The valuable intermediates were essential to the commercial prosperity of the industry, and gas undertakings should pay more attention to them in the future. He looked forward to the time when every well-equipped gas-works would have its proper staff of chemists, and would distil its own tar and take out the bye-products, instead of sending them on to someone else to make the profits. In conclusion, he hoped that the Association would continue its good work for many years.

Sir GEORGE DAVIES responded. He pointed out that the trade of the country was dependent upon the usefulness of the particular trade organizations. This was true also of public utility services; and he could not help feeling that the gas industry was exceedingly well served by its different associations. He referred to the great work done by the National Gas Council and the Society of British Gas Industries. The B.C.G.A., too, could claim that it had also done a very large portion of the work which had brought success to the industry. Speaking of electricity, he said there were those who had thought that the gas industry would be a decaying industry; but the record of every progressive gas undertaking, whether municipally or privately owned, had shown that, alongside the development of electricity, they had had an increase in the usefulness of gas and in the trade done. The extent to which gas was applied to heating and industrial purposes was astonishing; and he supposed there was scarcely a gas undertaking that could not show, during the last 10 or 20 years, a progressive increase in their output and an additional responsibility resting upon them to develop their works in the very best way, by meeting this growing demand for gas. Those in the industry were not merely carrying out their responsibility to the shareholders. They also had to see that they carried out properly the duties they owed to the public, because they were entrusted with a monopoly. They had no right to shirk their work because of that monopoly. Finally, Sir George expressed his very great appreciation of the splendid assistance and co-operation he had received (as President) from Mr. Goodenough, Mr. Mason, and the other officials of the Association, and said he felt sure that Alderman Lloyd would have from these gentlemen the same loyal help that he himself had received.

GAS AS A SERVICE TO INDUSTRY.

The final session of the conference was held on Wednesday morning—Sir GEORGE DAVIES presiding.

Before commencing the business, Sir George expressed regret that Mr. Howell was still unable to be present through ill-health. Another gentleman they had hoped to see was Alderman A. Ball,

of Nottingham—a Vice-President. He had come to Bristol to attend the conference, but had to be taken away under medical supervision. It was agreed by the meeting that a letter of sympathy should be sent. There was also a letter from another Vice-President, Mr. H. M. Thornton, who had intended to be present, but regretted that, owing to the death of his mother, he was unexpectedly prevented.

Coming to the business of the meeting, Sir George said that they could, as representing the gas industry, congratulate themselves upon the fact that on the previous day the subject of gas as a public service was treated most ably from different points of view by various speakers and by the readers of different papers. They all appreciated the trouble which the authors of papers had taken to prepare them. The contributions that morning would deal with the further usefulness and possibilities of gas; the subject for discussion being "Gas as a Service to Industry." They were all aware that gas had an expanding power in its uses to industry, and those of them who had read the suggestions made in "A Thousand-and-One Uses for Gas" must realize the extent to which it had been applied in many directions; but it was not generally appreciated by the public. He called upon Mr. Robert Watson, of Doncaster, to read his paper.

Modern Gas Lighting, with Special Reference to the Illumination of Factories and Workshops.

By ROBERT WATSON, Engineer and Manager to the Doncaster Corporation Gas Department.

In this paper, the author referred briefly to the beginnings of incandescent gas lighting, the introduction of inverted burners, and superheated burners; photographs of lighting by the last-named means being exhibited. He said that for the reflector type of superheater burner lamp, the remarkable efficiencies of 40 to 50 candles per c.ft. of gas are claimed; and according to the number of nozzles employed—each using about 2 c.ft. of gas—lamps of candle powers running up to 1000, and even much higher figures, are obtainable for the illumination of large workshops, shop exteriors, yards, &c. These burners in varying units have been used extensively for street lighting, and their worth has been clearly proved. It is certain that modern gas lighting with such efficiencies is cheap. A cluster light of two superheater burner nozzles, using (say) 5 c.ft. instead of the claimed 4 c.ft. of gas, and giving a light of 120 candles, will cost, with gas at 4s. per 1000 c.ft., only ½d. per hour. The small mantles last for a long time, and the cost of their renewal in twelve months is negligible.

By means of the high-pressure method, a lighting value of 60 candles per c.ft. of gas is obtained, and the gain from the point of view of gas consumption is apparent. The units of light usually employed in factory work are 100, 150, and 300 C.P.; but lamps running up to 4500 C.P. can be, and are, employed for large spaces. Lamps of 2000 and 3000 C.P. are in use in many of the main streets of London. Costs of actual installations have been published from time to time, and these are in general agreement; indicating that, with gas at (say) 4s. per 1000 c.ft., 1000 candle light can be maintained for about 0·8d., or just over ¾d., per hour. The system has given considerable satisfaction to users, on the score both of cost and the quality of the light—the softness and steadiness of the latter being marked features.

The application, rather than the production, of artificial light has during recent years received close and careful attention by lighting experts and physiologists alike. This study has proved profitable, and great progress has been made towards the attainment of rational illumination suitable for definite purposes and places. Good and adequate illumination is a requirement of civilized life and a necessity in business and industrial work. Illumination, however, like all other blessings, can be abused, and if badly planned or wrongly employed may have ill effects on eyesight and health and be detrimental to physical ease. The possibility of the latter troubles has been the subject of many papers and numerous discussions. It has not escaped the notice of authorities concerned with the welfare of those employed or engaged in public and industrial buildings—such as schools or factories. So far as the latter are concerned, governments have now included the matter among their quasi-parental functions, and in several countries legislative lighting provisions have been made for the general safety and protection of those engaged under certain conditions of work or study. Although statutory enactments may at times cause perturbation, these are to be welcomed, acting as they do in the direct interests of employers themselves.

Lighting experts (or as now described, illuminating engineers) have, from their practical experience, materially helped in crystallizing views as to the lighting necessary to ensure, not only adequate, but also safe illumination. It would be of service to refer to some of the conclusions based on their research, as indicating what is, first, expected in the interests of workers, and, secondly, advisable if efficiency and increased output are to be achieved. Such reference might serve to make more widely known the probable statutory requirements of the future. Mr. Watson then went on to refer to the recommendations of the Home Office Committee on Factory and Workshop Lighting; stating that, while these recommendations were not regarded as final, the Committee do suggest the establishment as "recommended practice," of the minimum values of 3 foot-candles for "fine," and 5 foot-candles for "very fine" work; and they schedule the nature of industries which may come under these general terms. He then detailed regulations on the subject adopted in the United States.

Mr. Watson quoted some examples of illuminating requirements, and declared that good lighting undoubtedly pays from every point of view, and money invested in a rational and improved scheme of illumination may be regarded as a profitable investment. Discussing the proper distribution of light, the author said that the illumination afforded by incandescent gas lighting can, and does, satisfy the different requirements.

The direct method of gas lighting is, Mr. Watson proceeded, usually adopted and is the more economical, since practically the whole of the light is available, and the illumination is not dependent on the varied reflective power of ceilings and walls. Direct light sources properly placed and shaded are quite satisfactory. From the point of view of decoration, the choice of shades and reflectors is considerable; but it should be borne in mind that obscuration is to be avoided, and there is no necessity to use (say) heavily frosted, coloured, or thick opal glass, which causes distinct loss of light. Glassware of the Holophane or prismatic type is particularly useful, since it materially helps in the prevention of a dazzling effect, and is excellent for both diffusing and distributing the light rays. An example of the use of this glass (adopted in a boot factory) was recently published. The incandescent gas-burners, fitted with Holophane reflectors, and placed at a height of 2 ft. 6 in. above the work on the table, gave the illumination of 12 to 16 foot-candles, while the mantles were screened from the eyes of the operators.

The purely indirect system of lighting, whereby the illumination is obtained by reflection, is expensive, whatever illuminant is employed, and it presupposes (and, indeed, necessitates) light-coloured ceilings and walls to ensure effective illumination. Even these will gradually become darker in tint or dirty through the deposit of ever-present dust. The reflection from ceilings and walls is a matter of considerable importance; and this is shown by the following table given by the Holophane Company in indicating its importance in connection with their glassware.

Condition of Ceiling.	Condition of Walls.	Increase over Calculated Illumination (of the Light Sources).
		Per Cent.
Very dark	Very dark	0
Medium	Very dark	15
Medium	Medium	40
Very light	Very dark	30
Very light	Medium	55
Very light	Very light	80

The semi-indirect method of illumination has the advantage of being less wasteful of light, and virtually combines the merits of both the direct and indirect systems. Gas-burner clusters shaded by translucent bowls, which allow a certain amount of light to be diffused downwards, and fitted overhead with reflectors from which the greater portion of the light is distributed throughout the room, yield effective and agreeable illumination. The method can be thoroughly recommended where the conditions call for it; and it is particularly adapted for the illumination of offices, shops, showrooms, and similar places.

As to glare and shading, Mr. Watson said that about 5 candles per square inch is regarded as the maximum illumination advisable where the eye directly encounters light rays. With proper diffusing globes, this result can be easily achieved without any great loss of light. There are many suitable globes on the market with a considerable range of efficiency and artistic effect. The advantages afforded by the silica cup of high-pressure gas-lamps can now be secured for low pressure or ordinary lighting purposes. This ware, unlike ordinary glass, is practically unbreakable, and is unaffected by the heat. The material is not absolutely transparent, and its opalescence guards the eye from any direct ray brilliancy. The ware is suitable for all lighting purposes, both direct and semi-indirect, and yields an exceedingly pleasant illumination, and of a colour which is restful to the eye. The direct loss of light through "Vitreosil" glass is small, and estimated at about 10 p.ct.; but against this is the gain due to the excellent diffusion obtained.

After alluding to the subjects of gas light and health, and convenient methods of control, Mr. Watson concluded by remarking that, with such general possibilities as it possesses for the provision of good and suitable illumination, coupled with low costs, the gas industry is justified in the recommendation of gas for any lighting purpose, and in the suggestion to all who contemplate improvements in their lighting methods that modern gas can provide them with all they need, whether to satisfy probable statutory requirements or to achieve those of business or social amenities. Any such provision can, too, be made with existent gas-piping and very little, if any, structural alteration or expense, and at a minimum of cost so far as lighting fixtures are concerned. In the purchase of gas burners, lamps, and mantles, as in that of other appliances, economy is best achieved by the choice of well-designed and well-made goods. The cost of these is not great, even compared with many of the badly-made and inefficient appliances unfortunately frequently bought by gas users.

DISCUSSION.

Mr. H. E. COPP (Hull) said everyone would agree that Mr. Watson's paper was a most extraordinarily complete and accurate statement of the case for gas lighting. He thoroughly and firmly believed in the future of gas lighting. Some people seemed to assume that all lighting had been delegated to the electrical people; but he did not believe that, because the character of gas lighting was such that it would always find a large and useful field. Further than that, lighting was their best advertisement. Anyone who was an electrical advocate, perhaps, would enter a house and fail to notice the gas-stove in the kitchen, and very seldom noticed the gas-fire in the bedroom. In his own house people talked of the excellence of his electric lighting, but he had not electric light in his house. [Laughter.] He emphasized the point that lighting was the best advertisement for the gas industry. They had been told of the very wonderful effects of light on health; and he could not help thinking that there was also a great future for gas, especially high-pressure gas, in this field. They all knew that when they got round about a certain temperature the character of the light altered very materially, so much so that with high-pressure lighting it was possible to match colours very accurately. He did not think there was any other form of light by which natural colours could be matched so well as by high-temperature gas. This led one to the best means of obtaining these conditions; and he referred to the superheater burner, in which the air and gas were preheated before combustion. Dealing with types of burners, he said that of the multitude of burners on the market, there were many with more or less serious defects. He did not think that there was a single burner which had not some defect. They had to avoid the use of metal which discoloured; and they should always avoid the use of polished brass. Even antique copper became very shoddy after a bit, and destroyed the æsthetic effect of gas lighting. There was an excellent burner (with which a very large London undertaking was associated) which had two important defects; there was no gas regulator and no air regulator, and it could not be used universally. Mr. Watson had given figures relating to high-pressure gas lighting, and had said that 60 candles per c.ft. of gas was realized. He himself had had experience of this, and he never burned more than 52. When installing high-pressure lighting he almost invariably recommended an electric motor. This showed that gas people were not prejudiced in the matter of gas if they really had something better. Dealing with the Vitreosil globe, he pointed to the importance of having the shape of the globe carefully proportioned to the size of the mantle, because if it were too large the efficiency diminished. The source of the light should be as near the globe as possible. Mr. Watson had also given figures of illumination for different purposes, which he (Mr. Copp) believed were the American standards. He did not know what the standard was in Bristol; everything he had seen there had been excellent, except the public lighting. If Mr. Watson calculated the foot-candles on the surface of the road there, he would have to go into a good many places of decimals.

Mr. C. F. BOTLEY (Hastings) also firmly believed in the future and the present of gas lighting. The title of the paper placed him (Mr. Botley) at a disadvantage, because in such a district as that with which he was concerned the opportunities for industrial lighting were comparatively small. However, one was sometimes impressed by the splendid lighting which could be obtained in industrial concerns. Taking high-pressure lighting, for instance, the photographs which were available and the information given in "A Thousand-and-One-Uses for Gas," indicated the splendid effects which could be secured with high-pressure lighting; and there was no question, in the ordinary way, of cost as compared with any other illuminant. The hall in which they were meeting was lighted by electricity. In a hall of that character they could, with the use of gas as an illuminant, control it from a point in the same way as electricity; they could add to the ventilation already provided; and, at Bristol prices, he felt sure that gas would show a very excellent comparison with electricity as regards cost. Again, there was a drill hall adjoining, in which he had noticed heating pipes overhead. It was a difficult building to heat; but had that hall been illuminated by gas, the necessity of overhead heating pipes would have been done away with. Ordinary gas light did not constitute glare. It was one of the greatest advantages of gas lighting that the intrinsic brilliancy of the source of light was so very low compared with electricity, the half-watt or gas-filled lamp; and they must not discount the value of that attribute of gas lighting. In the ordinary way there was no glare, properly so-called, which necessitated shading the eyes as they would when facing a flashlight. He disagreed with the strong recommendation of semi-indirect lighting. In this matter he was afraid that those connected with the gas industry, more particularly the manufacturers of apparatus, were following the fashion set by the electricians, because they (the electricians) could not help themselves. It was extravagant; and it was unnecessary when they were dealing with gas lighting. Why not shade the light in some sensible manner in order to get the rays where they were generally wanted? They did not want illumination on the ceiling; and why should they not get the benefit of the whole of the intrinsic value of the light? He agreed that there were fittings on the market which were made of metal unsuitable for exposure to heat. In domestic lighting they must have some device to protect the mantle. He emphasized what had been said by Mr. Copp with regard to the Vitreosil globe. If properly used it was a splendid thing; but it must be properly used, because if the mantle and globe were correctly proportioned there was an increased illumination, due to the higher temperature. With regard to the lighting of workshops, this was a very difficult matter, because they had to have both general and local lighting. As to the general lighting of workshops, the illumination should be as even as possible; otherwise a person going from one shop to another would think he was going from daylight into darkness. The general lighting in workshops should be as uniform as possible, always having regard to the particular nature of the operations carried out. Dealing again with appliances, he said there was, of course, a joint committee of the manufacturers and users of gas appliances; and they were hopeful that some really good work might follow. He trusted everybody who was keen on this matter would support the effort that was being made to produce burners which could be relied upon and could be manufactured at a reasonable price. Not only did the burners need to be as good as they could get them, but they must be of materials which were not subject to the defects mentioned by Mr. Copp. There was every opportunity for such appliances to be produced; and it devolved upon the members of the gas industry to buy such burners when they were on the market. As regards getting rid of inferior burners, this was a very difficult matter. Probably the best way to do it was to render every assistance to the people trading in their towns, and, above all, for gas suppliers to set the best possible example by supplying the proper goods and maintaining them.

Mr. NORTON (New York) said it afforded him a great deal of pleasure to attend the conference, and he congratulated the author of the paper. The little information he had came almost entirely from the electric light field; but the conference might be interested in some experiments that were being conducted in the United States, and which had not yet been published. Mr. S. E. Doane (Chief Engineer of the Lamp Division of the General Electric Company, Ohio) had been conducting experiments in his laboratory for the past eighteen months on the effect of light. This gentleman had been watching some people playing tennis; and they had had to stop because the light was not good enough. He had, therefore, investigated some peculiar effects of light, and had found that, while there was plenty of light to enable him to see the play, there was not enough for the players to see the ball as it passed backward and forward. Further study led to the thesis that probably our sight was not continuous, but was based on a series of minute photographs rapidly repeated, and that there was a great relation between that and the amount of light necessary to see quickly-moving objects. This had led to a number of demonstrations, one of which consisted of putting printed matter through a screen at certain speeds and under various intensities of illumination. From that it was found that there was a very definite relation between the speed of moving print and the amount of light; and in almost every instance, with intensified illumination, various types of persons (some of them uneducated persons) read at a very much greater speed. A further investigation was carried out which seemed to explain the usual afternoon fatigue which was apparent in factories and offices. It was found that if the illumination were increased at the particular time when the fatigue was expected, it resulted in an increase of the output of a factory, instead of the usual decrease. The work was piecework. Mr. Doane expected to make the experiments public shortly.

Councillor WRIGHT (Southport) pointed out that Mr. Watson had referred only once in the paper to schools. He came from sunny Southport, where they had more schools, churches, and chapels than workshops and factories. Had Mr. Watson had much experience in the lighting of schools, churches, and chapels—especially the schools? In the chapels they found a dim, religious gas light. Mr. Bond (the Gas Engineer at Southport) and he himself had thought the matter over, and had asked the authorities to allow them to make experiments. While at the conference, however, he had been wondering what was the use of their ferreting their brains if they had a specialist in this matter in Mr. Watson.

Alderman DEPREE (Exeter) said there was no special allusion in the paper to foundry lighting; and he would be glad to hear what had been Mr. Watson's experience in this direction. His concern had tried various methods of lighting their foundry; and gas had proved a failure up to the present. In the first place, there was a considerable amount of steam rising in a foundry. Mr. Watson had said that in factory and workshop lighting the mantles could be specially protected; but the speaker pointed out that when steam was rising the globes became so clouded that the effect of the lighting was almost done away with. There was also a considerable amount of dust. He had had to dispense with gas lighting in the foundry and use electricity.

Mr. F. W. GOODENOUGH said that this question of dust in factories had been overcome by Messrs. Keith and Blackman. They had enclosed the whole of the lamps, which were practically hermetically sealed. The air supply to the burners was obtained through special piping from without, and so the dust was kept out. He suggested that this might be worth investigating.

Mr. W. WILSON (Burton-on-Trent), who spoke from the back of the hall, and could not be heard at the Press table, was understood to refer to a number of successful installations on the Selas system of high-pressure lighting in workshops.

Mr. F. W. GOODENOUGH asked Mr. Wilson what proportion of air was mixed with the gas in the case of the Selas system.

Mr. WILSON replied that he believed there were three portions of air to one of gas.

Mr. WATSON, replying to Councillor Wright, said that the paper could not possibly have dealt with every phase of gas lighting; and he had made the briefest reference to schools. The Americans had adopted a code which was exceedingly useful, and to which he would like to refer Mr. Wright. He could rest assured that if he studied the foot-candle illuminations given there, and the examples given in "A Thousand-and-One Uses for Gas," he would find some very excellent examples absolutely suitable for school purposes, and which would be to the satisfaction of the school departments. With regard to helping Councillor Wright and Mr. Bond, he pointed out that Mr. Bond was an expert in lighting matters.

The next paper was on the subject of

Gaseous Fuel and Power in Industry.

By W. M. MASON, Manager of the Association.

The author opened his paper by remarking that no conference with a theme indicative of the public service side of the industry would be complete without reference, however brief, to the remarkable and ever-increasing part which town gas plays in the service of industry. If William Murdoch could again visit the South-Western District, the scene of his first triumphs, he would be more than surprised at the remarkable and far-reaching developments of his original discovery; and in no section would the results of modern achievement and invention be more marked

than in the industrial. Gas is employed in 64 primary trade processes, and there are actually 2706 known and tabulated trades in which gas is used for an average of seven processes in each.

The gas industry lost much by the war; but out of evil came good in one respect, both from the point of view of gas and of the public which it serves. To speak more particularly, the industry encountered incalculable difficulties in the engineering field, and many hardships in the financial field; but the strain put upon its scientific and financial resources brought out those British qualities which always triumph when Britishers are most pressed. When the members of the industry were straining every nerve to provide those at home with a serviceable gas manufactured from coal supplies often unsuitable in quality and always inadequate in quantity, and to carry on with depleted staffs and with plant sadly in need of repair and replacement, and when they were, in addition, doing their best to serve those at the front by providing them with high explosives extracted in the course of gas manufacture—a double difficulty—all the available resources of science, engineering, and finance were put severely on their trial.

The result is that both in the manufacture of gas itself and in the general manufacturing processes in which gas is employed, a fund of knowledge has been acquired and co-ordinated which is available in peace time, and which has opened up new fields for the application of gas to industrial uses, whether for heat or motive power, in ways so varied, and on a scale so large, as to surprise even the men who have spent their lives in the gas industry. Had it not been for the tremendous demands made and the ever-present time limit for investigation and experiment to fulfil those demands, the advance achieved in the industrial applications of gas during war years might have taken at least a quarter-of-a-century of ordinary development. It has been said by one of the leading gas-appliance manufacturers that "more progress in its adaptation to manifold processes was made in five years than in the previous fifty." Some indication of this is found in the fact that in one year of the war the amount of gas sold for industrial purposes alone in Birmingham reached the colossal total of 2680 million c.ft.

Through the Commercial Organization Department, the Association have prepared during the past seven years a comprehensive list of the trades in which gas is used for furnace work and power, with the processes involved in the respective trades arranged under each, and a complementary list of processes with a catalogue of the trades to which they apply. The whole document, with additions as they are gathered, is available for those members of the industry who subscribe to the Commercial Organization Service. This valuable memorandum places members in a position to advise manufacturers in their area of supply, and is a guide to them in applying to the Association for advice and information upon the results of the latest research or experiment on any particular point, if they are called upon to advise a consumer. In addition to this list of trades and processes, the Association have gathered together from different parts of the country several hundreds of photographs, diagrams, and charts of gas-furnaces, engines, and other industrial appliances in use in actual works, together with gas consumption and production figures. [A selection was exhibited at the conference.]

In taking a survey of the industrial field, Mr. Mason said that the gas industry must educate the public a lot more as to the all-in gas policy, and at the same time provide consumers with first-class appliances, efficiently made, tested, and adjusted to particular requirements, which will give, if anything, more than the duty claimed for them. The flimsy and inefficient trash that consumers, and even some gas managers, continue to buy (or it would not be manufactured) is due to a short-sighted policy. A badly made, poorly adjusted, or flimsy piece of gas apparatus is dear at any price. Particularly is this the case in the industrial section, where working results count for so much; and such short-sighted and miscalled economy should never be tolerated.

One of the essential requirements of any gas undertaking which seriously sets out to cater for the industrial load is the provision of properly equipped and adequately staffed furnace showrooms. Work of this nature, to be really effective, must be handled by trained men who are capable of seeing that the claims made on behalf of the apparatus advertised, supplied, or recommended can be justified by working results. Systematic inspection of plant in operation is another essential to continued success. One of the most remarkable installations of gaseous fuel in the country—a huge one at Liverpool—owes much of its success to careful and regular oversight on the part of the chief officers of the Gas Company there. The last few years have seen many marked developments in the use of town gas, particularly in connection with melting, annealing, hardening, tempering, carbonizing, forging, and welding, and for the heat treatment of metals generally. This may be accounted for partly by the reductions which have been made in the prices charged for gas for manufacturing purposes, but chiefly by the many and varied improvements which have been made in connection with gas-furnaces themselves.

The advantages of gas as compared with solid-fuel fired furnaces were enumerated by Mr. Mason, who concluded his paper with a section dealing with the use of gas for power purposes.

DISCUSSION.

Sir Arthur Duckham, K.C.B., said they were discussing a paper dealing with a field which was entirely their own. In this field—gas for industrial purposes—he could not appreciate that there should be any competition from any other source. The gas industry could fulfil the needs of the manufacturers right through without fear of failure, and with certainty of success. The gas industry alone could give a manufacturer any temperature that he might require. With the improved burners, effecting the recuperation of the gas and air, temperatures could be obtained which were only restricted by the suitability of the refractory material of which the furnace might be built; and temperatures could be attained either of an oxidizing character or a reducing character. This meant that they could give an ideal condition in the furnace to suit all needs; and Mr. Mason's paper had shown the enormous field which lay open to them. But he would impress upon them, both on the manufacturing and on the engineering and technical side, that in this line of business there must be super-excellent service. It was all very well to put in a plant for a highly technical heating process; it must be followed up wholeheartedly, both by those supplying the gas and by the manufacturer, in order absolutely to get the conditions required. Dealing with smoke, he said he had been talking to a member of the conference on the previous day, who had told him that if Sheffield were clean it would be bankrupt—there were processes in Sheffield which necessitated smoke. He had never heard such a statement; and this idea must be eradicated. There was no need for smoke in Sheffield or any other town. They were only on the very fringe of the development of gas for industrial purposes; and they hardly knew where they were going. It was not a matter of price—the benefits that accrued from the use of gas were such that price did not count; but as they extended its use, the price would come down in consequence of bigger consumption. Undoubtedly the solution of the electrical problem in this country was electricity generated by gas-engines; and they should go all out for this. They could get greater efficiencies with the gas-engine dynamo *cum* waste-heat boiler than with any other method of making electricity; and this was another great line to be tackled.

Mr. W. Wilson (Burton-on-Trent) referred to experiments which had been made at Burton in an endeavour to render the town smokeless. A brewery there, when working at full tilt, gave out a tremendous amount of smoke; and he had carried out experiments for over six months on gas firing. He had been told that he could not do it, and he had maintained that it could be done. He maintained that there was no furnace too large for gas firing, and that there was nothing which gas could not do; and he was able to start experiments and to carry them through successfully. The boilers were large ones, using 3000 odd gallons at a time. Some day the price of gas might be nearer the pre-war level; and when that happened, he hoped they would have smokeless furnaces.

Dr. C. M. Walter (Birmingham) referred to Mr. Mason's statement that in one year of the war the amount of gas sold for industrial purposes alone in Birmingham reached the colossal total of 2680 million c.ft., and said it was interesting to note that of this volume of gas no less than 100 millions were taken by a single firm. Some other firms used gas to the extent of 11 to 17 millions a year. He mentioned that there had recently been developed the Walter's patent gas-sealed tube furnace, which used gas not only for heating purposes but to prevent oxidation. It was being employed by the Redditch needle manufacturers and by pen makers. In Birmingham they had extensive showrooms; and they hoped shortly to be able to demonstrate practically every type of furnace. One point referred to by Mr. Mason, and which was most essential in connection with the industrial load, was the systematic inspection of plant in operation. As Sir Arthur Duckham had said, it was important that men who had had experience in many directions in connection with manufacturing processes should be sent to deal with the problems that arose. In Birmingham, they made their manufacturing consumers their friends, because they hoped, in many other directions, to increase the consumption of gas.

Close of the Business Meeting.

Sir George Davies said that none could fail to recognize that a tremendous amount of useful information had been given at the conference, and the great possibilities of the gas industry pointed out. Sir Arthur Duckham had described the position in the best possible way when he had said that they were just on the outside fringe of the application of gas to industry. The application of gaseous fuel to industry had been before the engineers and organizers of trade for years; but it had never been followed up and developed and carried to that conclusion which made the ultimate fulfilment of it possible at present.

Mr. F. W. Goodenough proposed a comprehensive resolution of thanks to those who had made the conference so successful. It was to the effect that the most cordial thanks of the members be accorded to the Chairman and Directors of the Bristol Gas Company for their generous hospitality throughout the conference, and to Mr. Halliwell and his staff for the excellent arrangements made for carrying it out, and for the comfort and convenience of the members and visitors; and to the Lord Mayor and Corporation of the City for the facilities offered to the Association for holding the conference, with special mention of the energy, skill, and courtesy displayed both before and throughout the proceedings by Alderman J. Fuller Eberle (Chairman of the Museum and Arts Committee). The work of the Executive Officers in arranging the conference had been extraordinarily easy owing to the generosity of those who had been mentioned; and they were all greatly indebted to them for having made the conference the most successful that the Association had ever held. He emphasized their obligations to Mr. Halliwell.

Dr H. W. Russell Bencraft seconded; and the resolution was carried with acclamation.

Sir George Davies replied on behalf of his colleagues and himself, and expressed appreciation of the kind vote of thanks. It was a great pleasure to have the opportunity of welcoming the Association to Bristol.

Mr. Halliwell also expressed his thanks. It had been one of his ambitions, he said, to beat what Manchester had done ten years ago. Manchester had been an inspiration to him; and that inspiration had been renewed in Bristol. He was sorry that the 16 p.ct. of non-subscribers to the Association had not been present at the conference, and urged the Association not to relax effort until every undertaking in the country was a member.

Alderman J. Fuller Eberle, who also replied briefly, said that it

was an enormous pleasure to those in Bristol to do anything they could to make the visit of the Association a happy one, and the pleasure of seeing the members was ample recompense for anything that he and his colleagues had done.

Mr. J. H. ELLIS (Plymouth) proposed a vote of thanks to Sir George Davies for his part in the conference. They were all indebted to him, not only for the part he had played in the conference, but for the day-to-day work and the unremitting care he had bestowed upon the affairs of the Association. The Association had made great advances during the time that Sir George had been President; but much still remained to be done, and he felt sure that the new President would derive great support from what had been accomplished by those before him.

Mr. ALFRED PROCTOR (York) seconded, and associated himself with the remarks of Mr. Ellis.

The vote of thanks was accorded enthusiastically.

Sir GEORGE DAVIES, responding, said that the kind words which had been spoken were an echo of that wonderful spirit of kindness and appreciation which it had been his privilege to receive from every member of the conference.

This concluded the business of the conference.

LUNCHEON.

A luncheon by the Vice-Presidents and Members of the Association to the President of the Association and the Chairman and Directors of the Bristol Gas Company, was then given at the Victoria Rooms, Clifton, at which Alderman J. H. LLOYD, the newly-elected President, occupied the chair.

The Loyal Toast having been duly honoured,

The PRESIDENT proposed the toast of "The President, and the Chairman and Directors of the Bristol Gas Company." He expressed regret that Mr. Howell, the Chairman of the Company, was still unable to be with them, and wished him a speedy and complete recovery. To all those mentioned the Association offered its most cordial and hearty thanks, and were exceedingly grateful for the hospitable way in which the members had been entertained. He looked forward to the next conference, when he hoped to see them in Birmingham. He assured them that anything that Mr. Smith (the General Manager at Birmingham) and his staff could do to help forward anything in which the members were interested, would be done. He suggested that it might be possible to arrange an exhibition of gas appliances there, and the members might care to visit works; if so, he would make arrangements of that character. He expressed the thanks of the Association to Alderman Eberle and Mr. Halliwell.

Sir GEORGE DAVIES, in responding, expressed his regret that Mr. Howell had not been present, and also the disappointment of Mr. Howell himself. He would like to convey to him an expression of the sympathy of the members. ["Hear, hear."] He again referred to the pleasure it afforded the Company to welcome the members.

Mr. F. W. GOODENOUGH proposed the toast of "The Press." He congratulated Bristol upon its Press, and the Bristol Press upon its head, Mr. Charles Wells (Director of the "Bristol Times and Mirror," and President of the Institute of Journalists), who was honoured and respected wherever English-speaking journalists were known. He had a reputation for straightness, cleanness, and honour in journalism which was an example to all in the profession. The Press was a great power in the education of the people and the dissemination of information to them. There was only one power greater than that of the Press, and that was the power of truth; and in so far as the Press and truth were one and the same, in that measure it was a power of good and a power that would prevail. The Association had every reason to be grateful to the Press of the country for its readiness to give publicity to correct information. He coupled with the toast the name of Mr. Charles Wells.

Mr. CHARLES WELLS, replying, said he was head of one journal; but could speak for the other journals as well as for his own, because they were all on the very happiest terms of relationship. He thanked Mr. Goodenough for his remarks as to the Bristol Press. He admired very much the masterful way in which the Association put forward their advertisements, and congratulated those concerned. He congratulated the Association also on having come to Bristol, where they had had the good sense to leave the gas undertaking in the hands of a Company. He believed the consumers, of whom there were many thousands in the city, had every reason to be satisfied.

Sir PERCY STOTHERT, K.B.E. (Bath), then proposed the health of Alderman Lloyd, the new President, and wished him success during his year of office.

The PRESIDENT, in thanking the members, said he was very pleased to know how much was being done for the good of gas by these gatherings. The interests of the industry would be immensely enhanced by the papers read. Referring to the Birmingham conference, he said that, as one who, unfortunately, came from a municipalized undertaking, he naturally felt at a great disadvantage. [Laughter.] He sometimes felt there were advantages, however, in being connected with a municipalized undertaking; and if they could show them any in Birmingham next year, they would be pleased to do so. Somebody had mentioned that bad fittings came from Birmingham; but all he could say was that if gas departments bought rubbish it was their own fault. He felt that some steps should be taken to prevent bad fittings being used.

Midland Association of Gas Engineers and Managers.—The annual general meeting of the Association will be held at the Grand Hotel, Birmingham, at 2.30 on Thursday, Nov. 16, under the presidency of Mr. W. H. Adams, of Bilston. A paper is to be submitted by Mr. Thomas H. Poulson, Assoc.M.Inst.Mech.E., F.C.S., on "The Re-organization of the Stafford Distribution Department;" and the new education and examination scheme will be considered. In addition to the election of officers for the ensuing year, Mr. Vincent Hughes, of Smethwick, will be proposed for honorary membership of the Association.

Coke-Quenching Tracks in Retort-Houses.

In the two coal-gas plants of the Detroit City Gas Company, the coke as discharged from the retorts drops through shoots into buggies on a rail track below, and in these it is quenched by overhead sprays before the buggies are moved. Subsequently labourers push the buggies out of the house. The tracks must be kept in good condition, and the basement floor must give the coke-wheelers a good footing, in order to make handling of the buggies possible. Track maintenance had been a large item of expense, as the continuous use of the tracks and the wash of the quenching water had made it impossible to set the concrete properly. It was therefore decided to make-up the tracks in sections outside the retort-house, and roll the sections into place after the concrete was thoroughly set. Rough wood forms were used, and each slab heavily reinforced with scrap iron. Switches, cross-overs, and straight sections were all made up in this manner, and put into position between charges, without causing any delay in operation. It was thought that it would be necessary to join the concrete slab sections with some connection other than the ordinary fish plates used between the rails. This, however, has not been found to be necessary, the only precaution being to ensure a uniform well-tamped bed of cinders to set the slabs of cement on. All the retort-house tracks have been re-built in this fashion. The first sections have been in use for twelve months, and are still perfect. Nothing whatever has been spent on maintenance.

Removing Naphthalene Deposits.

Explaining the method adopted by his undertaking for dealing with naphthalene complaints, Mr. A. H. Anderson, of the Detroit City Gas Company, says that the presence of naphthalene in the high-pressure system is reported to the pressure department, who proceed to flush the main with gasoline. The high point of the main is located, and if necessary a riser similar to a drip stock is located at that point. Gasoline is then introduced under pressure, until no unusual loss in pressure through the area under treatment is noted. The gasoline is then recovered from the drips, and used again in different places, until it becomes saturated with naphthalene; but, of course, only a portion of the gasoline is recovered. The length of main treated in this way will vary from several hundred feet to some thousands of feet, depending on local conditions. In the low-pressure system, when a number of naphthalene stoppages have been grouped along a certain main, the high point of the main is again noted, and gasoline introduced through convenient services, district regulators, or special taps. The gasoline is recovered from the drips, as in the case of the high-pressure system. The quantity of gasoline introduced is that necessary to restore the drop in pressure along the main to normal, and may vary from 10 to 50 gallons. Experiments have been carried out in the high-pressure system with atomizing the gasoline under pressure, inasmuch as simple washing only removes naphthalene from the bottom of the main, and not any that may be deposited on the surface of the upper half. However, the flushing system has fully justified itself, as the following is the record of complaints since its establishment two years ago: 1920, 6142; 1921, 4895; 1922, 239.

Methods of Heating Gasholders.

Discussing in the "American Gas Journal" comparative methods of heating gasholders, Mr. George Wehrle, of the Denver Gas and Electric Light Company, says that during last winter an opportunity was afforded his undertaking to study simultaneously three different plans. They were using gas coke as fuel for generating steam; employing gas in the same way; and circulation of the water in the holder tank and cups, supplemented by gas-steam. The holders were of the same size and type of construction, and were all used as district holders. They were three-lift holders in steel tanks above ground; and the exposure was about the same in each case. In the climate prevailing there it is necessary to provide means of keeping the water in gasholders from freezing during five months of the year. The cost of heating by the third method was 45 p.ct. of the cost of No. 2, and 39 p.ct. of the cost of No. 1. A small centrifugal pump belted to a 10 H.P. motor was used to circulate the water in the holder tank and cups. The suction pipe of the pump was carried over the platform and extended about 4 ft. below the level of the water in the tank. Connections were made from the pump to the pipe supplying steam to the holder; the syphons being removed and jets installed in their place, pointing in a circular direction round the tank and cups. The gauge at the outlet of the pump showed 50 lb. pressure when the holder was full; and the velocity of the water in the top cup was sufficient at all times to keep ice from forming in this cup, except for a thin feather midway between the jets on one or two occasions when the temperature was below zero. Thus water was drawn from the holder tank and discharged into the cups, from which it overflowed on the inside of the holder back to the tank. A steam connection was made from the boiler to the suction side of the pump, and during extremely cold weather steam was injected into the water before it passed to the pump. In the case of future holders it is expected to instal a 4-in. suction pipe through the bottom of the tank extending along the side of the inlet pipe to a point near the top of the water, thereby securing the advantage of warmer water than can be obtained at the outside of the tank.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Finance and Unemployment.

SIR,—In the very generous amount of space which you have kindly given to my address to the Society of British Gas Industries about a week ago, you commence by saying that "Mr. Kitson's voice was at the meeting that of one crying in the wilderness," and you go on to say that my statements do not appeal to hard-headed men of industry, but they might to some Hyde Park audiences. Will you kindly extend the courtesy of your columns to allow me to make a few remarks in reply?

The Banking Reform League, of which I happen to be President, is composed of what I think you would admit are "hard-headed men of industry." It was formed during the war, when it was evident to those who had given the matter sufficient thought that we could not possibly return to our pre-war financial system without ruining our trade and industries and bankrupting hundreds, if not thousands, of business men. Among the gentlemen associated with me in this work, I may mention the following at random: Lord Desborough, who for some years has been connected with the London Chamber of Commerce; Mr. Wilfrid Hill, the chief proprietor of the County Chemical Company, of Birmingham, and who is also Chairman of the Calthorpe Motor Company; Mr. Ernest Payton, who is a well-known manufacturer of Birmingham; Mr. T. B. Johnston, who is the chief proprietor of the Bristol Potteries, and has organized the pottery industries at Stoke-on-Trent; and other similarly well-known leaders of industry. I may also mention another very distinguished name as one who is in hearty agreement with me—Prof. Frederick Soddy, of Oxford, who is ranked among the world's greatest scientists. Another distinguished man in his profession is Major C. H. Douglas, who is a well-known consulting engineer (he was for some years one of the chief engineers of the Westinghouse Company) and a man of very high scientific attainments.

Again, you are entirely mistaken when you say that all the financial experts are on one side, and on the opposite side to that which I have so long advocated. Mr. Falconer Larkworthy is probably the oldest banker we have in this country, and has been President of the Ionian Bank for a large number of years, and has been engaged in banking all his life. I think I can claim Mr. Larkworthy as one of those who agrees with me. Mr. Reginald McKenna is another well-known banker; and while he is not connected with our Banking Reform League in any way, you will find, if you will peruse his addresses delivered about two years ago, he strongly warned the Government against the deflation policy. In my conversations with Mr. McKenna's predecessor, the late Sir Edward Holden, who was probably the ablest banker whom this country has ever seen, Sir Edward expressed his views to me along the same lines—namely, that it would be a most suicidal measure for the Government to attempt to deflate the currency as they have done during the past two years.

I am free to confess that I have no apologies to make for preaching financial theories which have the endorsement of such a distinguished company. The views I expressed at the meeting are not those which I have hurriedly arrived at. On the contrary, they are the result of deep thought and study, and of my business experiences both in this country and abroad during the past thirty years.

To the list of those I have mentioned, however, I may add two other well-known American business men, who are working along similar lines to those that I have indicated—Mr. Edison, the inventor, and Mr. Henry Ford, the motor manufacturer. In my correspondence with these gentlemen, I find that they have been travelling in my direction for a long period. Mr. Edison has openly declared that there is no necessity for the use of gold as a medium of exchange or as a monetary standard, and Mr. Henry Ford has said things even stronger. In fact, his weekly publication known as the "Dearborn Independent" was started for the purpose of exposing the dangers of the gold-standard money and credit monopoly which exists in the United States to such a terrible degree. I may also mention further Mr. John Skelton Williams, who was Comptroller of the Currency and Assistant Secretary to the American Treasury under President Wilson. In a recent letter, he expressed himself very strongly on the evils inflicted to American trade and to the enormous spread of unemployment due, as he says, wholly to the deflation policy adopted by the American bankers. He has also issued a chart which he calls "The Tragedy of Deflation," showing that the losses of the American public—*i.e.*, the farmers, manufacturers, and wealth producers generally—by this infamous deflation scheme, have cost the American public more than they had to spend during the war.

These are facts which, had they been known to you, would surely have caused you to moderate your criticism of my address. I did not expect to make converts at the meeting. Indeed, the subject is so involved, and it has taken those of us who claim to understand it so many months of hard study, that it would be absurd to suppose that one could make a convert in a single afternoon's address. All I expected to do was to arouse an interest in the subject, sufficient to lead to a careful study of the works published on this matter.

You say that, in speaking of Germany's prosperity as due to her cheap currency, I did not mention Russia and some of the Eastern countries. Here, again, you are evidently misinformed. In the discussion that followed my address the Russian paper roubles were mentioned, and I stated that I had been expecting to hear this particular subject brought up, because it is a favourite one which the gold-standard advocates always mention as an illustration of the evils of a paper currency, just as they go back to the French *assignats*. The Russian paper roubles were issued by the Bolshevists for the express purpose of destroying the value of money as the surest method of destroying capitalism. Lenin has openly acknowledged this. But in spite of his declared intentions, the Russian roubles would not have fallen to their present low value had it not been for the fact that at the same time the Russian Government forbade private trading. It was this, more than anything else, that destroyed the value of the Russian paper currency.

May I say also in conclusion that *I have never advocated the mere inflation of money?* I have maintained, however, that of the two evils inflation is less deadly in its effects on trade and industry than deflation. Those familiar with my writings will bear me out in the statement that my chief efforts have been to provide a means whereby the currency could be stabilized. Both inflation and deflation are evils to be avoided if possible. I regret exceedingly that any remarks I made should have led anyone to believe that I am in favour of wholesale inflation.

Stamford, Nov. 6, 1922. ARTHUR KITSON.

LEGAL INTELLIGENCE.

A Gas Engineer's Motor Drive.

Mr. C. S. Shapley, Engineer and General Manager to the Leeds Corporation Gas Department, was the defendant in a case at Otley recently, where he was summoned on a charge of driving a motor car to the danger of the public. The case arose out of an accident on Aug. 29 at cross roads known as Catch 'Em Corner, on the road between Harrogate and Skipton—a beautiful stretch over the moors above the Washburn Valley. Mr. and Mrs. Shapley, together with Mr. J. T. Randall (Secretary of the Southend Gas Company) and Mrs. Randall, were having an evening run, when they collided with a motor van driven by Ambrose Carrington, farmer, of Summerbridge, Nidderdale. The van was turned at right angles, and Mr. Shapley's car was overturned, but fortunately nobody was injured. It was held that if Mr. Shapley had been driving at a reasonable speed the accident would not have happened. The defence was that the corner was approached at from 10 to 15 miles per hour; and in order to avoid a collision broadside on, Mr. Shapley accelerated, and just got clear of the van, when Carrington apparently lost his head, and swerved into the car. Mr. Leonard Downes, a motor-cyclist, who was passing at the time, gave independent evidence that in his opinion the driver of the van was solely to blame, as he was travelling too fast, and on the wrong side of the road. After a private consultation, the Magistrates, in view of this evidence, dismissed the case. A novelty introduced into the defence by Mr. Arthur Willey, the Solicitor for Mr. Shapley, was the submission in Court of a landscape model of the scene of the accident and the vehicles concerned, which was stated to be geographically and geometrically correct in every particular.

Asphyxiated by Gas.

A case of asphyxiation by gas has been investigated by the Chesterfield Coroner. An ironworker named Fred Maden, who lived in one of the municipal houses at Chesterfield, where gas was obtained by a shilling slot-meter, was found dead in bed, with the room smelling very strongly of gas. The widow said that, though the gas-fittings were in position when they entered the house, there were no burners upstairs. The gas was lighted as it came direct from the bracket arm. The tap in the bedroom was loose, and was half turned on when noticed. She thought her husband, in turning out the light before going to bed, had accidentally touched the tap again. Dr. Frazer said the fact that deceased had been gassed in the war would accelerate death. The Assistant Gas Engineer to the Chesterfield Corporation (Mr. John Hyde) stated that in the municipal houses the Gas Committee provided flat-flame burners in the bedrooms. He could not understand why there were no burners in this particular house. He did not see how, without a burner, a light that would be of any use could be obtained. The Gas Committee were only responsible for putting in the gas-fittings, and not for the burners. He was informed that flat-flame burners were fixed in this house. The Coroner returned a verdict of "Death from Misadventure," and suggested that the matter as to whether or not the Gas Department had provided burners to the gas-fittings of houses should be officially investigated.

Price Reduction at Newtown.—The Newtown Urban District Council have agreed to reduce the price of gas 4½d. per 1000 c.ft. to general consumers, and 6½d. to power users. Mr. Bridgewater said this was brought about by the saving in the cost of coal since the beginning of the year.

Reduction at Stafford.—Alderman Young (the Chairman of the Gas Committee) announced at a meeting of the Stafford Town Council last week that it had been decided to reduce the price of gas to quarterly and penny-in-the-slot consumers 6d. per 1000 c.ft. It was resolved that a similar reduction be made in the case of gas supplied outside the borough—except that in the Milton, Brocton, and Walton area the price charged be 8d. above the borough rate, instead of 10d.

Improvements at the Tipton Gas-Works.—The Tipton Gas Committee have recommended that a further amount of £2551 should be included in the detailed statement to be presented to the Inspector appointed by the Ministry of Health to inquire into an application for sanction to the loan of £19,968 in respect of vertical retorts, making a total of £23,500. The question was discussed at a meeting of the Council last week, when the Chairman (Mr. T. E. Salter) referred to the suggested improvements. Mr. Doughty said that, notwithstanding anything the Chairman could state on the matter, the scheme was still open to grave criticism. He was deeply concerned that, before sanction for the necessary loan had been obtained, they were asked to place the order, while, in fact, the work had actually been commenced. This was not business. The Chairman said that in the new plant the expense of renewals would be infinitesimal. They had introduced some of the finest improvements known in gas making. They had permitted the contractors to proceed with the foundations at their own expense in order to save time, otherwise the plant would not have been ready until next September. He was convinced the scheme would be sanctioned. The report was adopted; Mr. Doughty voting against it.

REGISTER OF PATENTS.

Gas Cooking Ranges.—No. 169,956.

CRANE, W. M., of New York (Assignees of H. W. O'DOWD, of New York).

No. 17,846; June 30, 1921. Convention date, Oct. 8, 1920.

This invention relates to gas or like ranges of the kind comprising heat generating chambers containing burners, and the top of which is closed like that of an ordinary coal-range, for example. The primary object of the present invention is to improve the heating efficiency and general convenience of ranges of this kind.

The range comprises a combination having for its essential components a burner or burners mounted in the front portion of the combustion chamber close to the lower surface of the wholly closed or wholly closable cooking top, and having burner orifices adapted to cause the flames to impinge directly on the immediately overlying portion thereof. An inlet for the secondary air is positioned in proximity to, and wholly below, the level of the burner or burners, so as to admit the air primarily to the bases of the flames—an important point, as by this means the greatest speed of combustion or flame propagation is obtained, and, moreover, the flames are so reduced in length that the burners may be located very close to the cooking top and thus exert their maximum heating effect. A chimney is provided for removing the products of combustion from the rear of the combustion chamber, there being a sufficient area of closed cooking top behind the direct flame-heated area to constitute a secondary heating surface.

Production of Smokeless Fuels and Coke. No. 186,085.

ILLINGWORTH, S. R., of Radyr.

No. 9129; March 24, 1921.

This invention relates to the production of smokeless fuels and coke by blending two coals, or blending a coal with semi-coke, or with iron or other ores. In this connection, the patentee points out, the resinic content and the volatile content of the coals have to be considered. The resinic substances may be defined as those portions of coal soluble in boiling phenol or boiling pyridine, and also soluble in chloroform. The resinic matter in a coal acts as a binder of the fixed carbon or residues formed on thermal decomposition. The fixed carbon from the resinic matter is a measure of its binding power. The amount of such fixed carbon varies with the carbon-hydrogen ratio; if this be below 14, the amount of fixed carbon is less than 20 p.ct. Moreover coals of higher C-H ratio than this gives less fixed carbon; and in the case of the lignitous non-coking types of coal of a C-H ratio under 15 to 16, the resinic matter is nearly always volatile below 350° C. This type of resinic matter is of little value as regards coke-producing properties.

According to the claims, the process consists in heating a blend of two coals (which is such that its resinic content is not less than 5 p.ct., but preferably not less than 8 p.ct. of its weight, and that a total volatile matter given off from the blend at 350° to 400° C. does not exceed 7·5 p.ct) to a temperature not exceeding 500° C. or to a temperature of from 50° to 100° C. above the minimum temperature at which the resinic matter in the blend is destroyed. The process may be similarly applied to a blend of coal with semi-coke or with ore.

Thereafter the product is submitted to carbonization at a higher temperature; the previous treatment having precluded troubles of expansion.

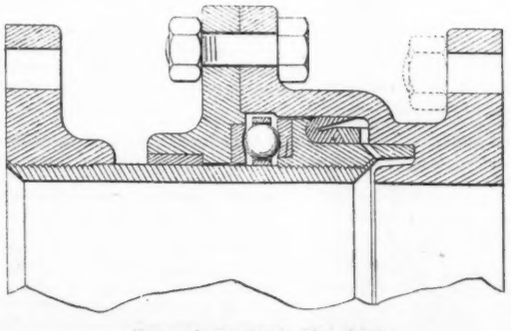
Rotatable Pipe-Joints.—No. 186,166.

DORMAN AND CO., LTD., and STEED, O. H. G., both of Stafford.

No. 17,339; June 24, 1921.

This invention relates to rotatable pipe-joints of the kind in which the relatively rotatable elements extend one within the other, and are connected together by means which comprise essentially a ball bearing for taking the end thrust incidental to the fluid pressure and a U section washer interposed between an internal periphery on the one element and an external periphery on the other, so as to resist the fluid pressure and provide a tight connection between the elements.

The object of the invention is to provide an improved joint of this kind which, while preserving all desirable axial rigidity, will comprise fewer parts, be more rugged of construction, and be easier of assembly than those heretofore proposed. It consists essentially in the arrangement of an annular abutment rigidly mounted upon the inner element, and constituting at once one element of the ball race and a support and protection for the U section washer.



Dorman's Rotatable Pipe-Joint.

One construction is illustrated by the accompanying drawing, which is a half-sectional view. It may be pointed out that the flange on the left of the ball race fits freely over the pipe, and the outer end of the annular space formed between them is provided with a dirt-excluding ring of any suitable material. The inner edge of the U-shaped packing ring is provided with a retaining ring, and a series of holes is arranged circumferentially in the sleeve in such a manner as to allow fluid under pressure to pass from the pipes to the inside of the U-shaped ring.

The pipes to be joined are connected to the flanges at each end of the joint as a whole, and can be relatively rotated at will, even though there is considerable pressure within the pipe line. It will be appreciated that by the use of these joints arranged at different angles, movement of the pipe line in any direction can be provided for.

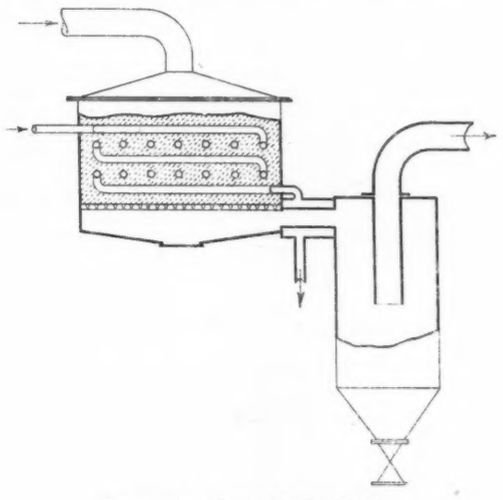
Gas Purification.—No. 185,780.

COX, K., of Putney, S.W., KERR, R. P., of Gateshead-on-Tyne, and BATY, E. J., of Luton.

No. 10,230; April 7, 1921.

This invention relates to a process of, and apparatus for, gas purification according to which the sulphuretted hydrogen and/or sulphur dioxide in the gas is removed, and the sulphur recovered. The Claus process for recovering sulphur from sulphuretted hydrogen, either pure or mixed with other gases, is well known; and the object of the present invention is to improve that process in respect to the mode of controlling the temperature of the reaction in the contact material, so that with moderate temperatures and small temperature gradients a high and uniform efficiency is maintained.

This object is accomplished by controlling the temperature of the reaction in the contact material by means of suitable heat-exchanging surfaces so distributed throughout the bed of contact material that, while the latter is divided into comparatively small sections each subjected to the action of attemperating fluid, the aggregate cross-sectional area of material, normal to the direction of flow of the gases, is considerable. Thus the transfer of heat through the surfaces, in conjunction with the heat evolved by the reaction itself, maintains a uniform temperature of reaction throughout, sufficiently high to prevent any substantial deposition of sulphur in the contact material and to ensure the sulphur being carried away from the reaction zone in the effluent gases, and sufficiently low to maintain it in the elemental state.



Temperature Control in Purification.

The heat exchanging surfaces may conveniently be pipes arranged in zig-zags or coils embedded in the contact material, as seen in the sectional elevation reproduced, which arrangement is found to give very good results. Any other arrangement of heat transmitting may, however, be employed which will provide a comparatively large aggregate sectional area transversely to the flow of gases. Steam may conveniently be employed as an attemperating fluid (in which case the heat-transmitting surfaces may on one side be an extension of the steam space of a generator to which the condensed water returns); or in cases where the composition of the gases to be treated requires it, liquids having a boiling point higher than that of water may be employed; or flue gases suitably controlled may be arranged to pass through.

The heat-exchanging surfaces are utilized at the commencement of the process to heat the oxide and/or the gas, so as to provide at once the temperature necessary to ensure the required degree of purification and to carry off the sulphur with the effluent gas instead of depositing it in the oxide or contact material; thus obviating the necessity for a prolonged passage of heated gas through the apparatus (without resultant purification) at the commencement of operations. The contact material may be any of the known materials suitable for the purpose, such as oxides of iron, alumina, manganese, or mixtures of these.

The object of the invention being to maintain the temperature of the reaction zone within the desired temperature limits so as to ensure the decomposition of the sulphuretted hydrogen and its elimination from the reacting zone as elemental sulphur, it will be understood that if, owing to the evolution of heat by the reaction or other causes, the temperature tends to rise unduly—*e.g.*, to such a temperature as to cause the re-combination of the elemental sulphur—the optimum temperature must be maintained by abstracting instead of by adding heat. It is found that the maintenance of a steady temperature of reaction

very considerably increases the efficiency of the process; the catalytic value of the contact material being in such circumstances very marked. This increased efficiency reduces to a minimum the quantity of contact material necessary.

The sulphur may be separated from the effluent gas by any suitable means—say, by passing the gas tangentially into a cyclone apparatus, from which it can be drawn off from time to time.

Atmospheric Gas-Burners.—No. 186,203.

PARRAM, R. W., of South Tottenham, N. 15, and CONWAY, J. K., of Highgate, N. 6.

No. 19,424; July 19, 1921.

This invention relates to atmospheric burners of the kind in which air and gas are led to a flat circular chamber formed by two metal plates separated at a distance apart; the upper plate being provided with a number of pierced conical holes having their smallest diameter uppermost, and of various sizes, graduated to give the best results.

A special feature of the burner is the arrangement of tubes through the upper and lower plates, so as to give an extra supply of air to the centre of the flame only, and also to drain away any moisture that may result thereby. The construction provides a large conical flame so supplied with air within its body as to give complete combustion of the gas and thus obtain great heat with economy.

Coin-Slot Closing Devices.—No. 186,290.

ANDERSON, J., of Edinburgh.

No. 18,499; March 7, 1921.

This invention consists in prepayment mechanism having a slot-closing device in the form of a slotted rod operated through a spring-controlled lever and cam, the latter preferably being mounted on an epicyclic crown-wheel cage. In carrying the invention into effect in one form by way of example, the crown-wheel described in specification No. 183,157 [see "JOURNAL" for Aug. 30, p. 478], carries a cam for moving the coin-slot closing device described.

This closure is formed by a slotted rod passing longitudinally through the coin-slot member and carrying a fixing for a retracting spring and a lever adapted to be moved by the cam referred to above. Rotation of the crown-wheel after a full number of coins has been inserted into the meter causes the cam to come into contact with the pin on the lever of the coin-slot closing device and so rotate the slotted shaft for the purpose of bringing a solid part of the shaft across the coin carrier and preventing further insertion of coins until some of the commodity paid for has been consumed.

High-Pressure Distribution.—No. 186,636.

MITCHELL, E. A., of Cannon Street, E.C.

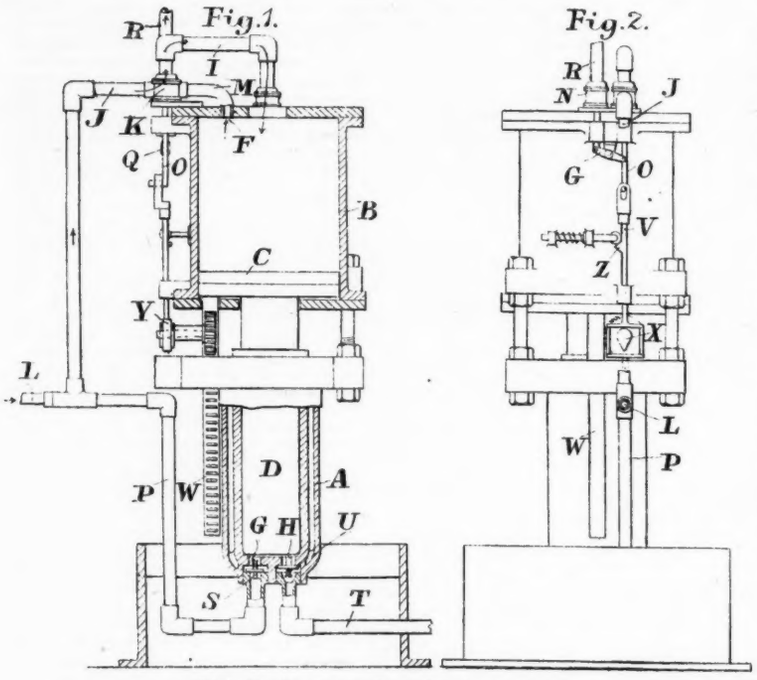
No. 9160; Mar. 24, 1921.

This invention relates to gas distribution under high pressure. In such cases it is usual to compress the gas at the generating station to a high pressure and to conduct it through a pipe of comparatively small bore to the distributing station. With such an arrangement the terminal pressure is very much lower than the initial pressure. For instance, assuming the generating and distributing stations are many miles apart (say twenty), the gas, owing to the friction of the pipe line, may fall from an initial pressure of (say) 50 lbs. per sq. in. to a terminal pressure of 10 lbs. per sq. in. If it be desired to conduct part of the gas from the distributing station to another distributing station at a considerable distance from the first one, it will be necessary, in order not to increase the initial pressure of the gas, or use a pipe line of larger bore, to instal at the first distributing station means for boosting the pressure of the gas received at that station, so that it may be transmitted to the second distributing station at a pressure suitable for use.

The present invention has for its object to enable this result to be attained in a simple and economical manner. There are provided for use at the first distributing station means whereby part of the gas received at low pressure can be raised in pressure by the remainder of the low-pressure gas, or part thereof, and transmitted through a second pipe line to a second distributing station. The low-pressure gas thus utilized as motive fluid for compressing the remaining gas to a suitably high pressure can, after such use, be distributed at a suitably further reduced pressure (say ¾ lb. per sq. in.) to gas users in the district supplied from this first station.

For carrying out the invention there may be provided for use at the first distributing station gas-compressing plant comprising two cylinders of different diameters and each provided with a piston and with valve-controlled inlet and outlet pipes. One cylinder is of less diameter than the other, and its piston is operated from that of the other. There are also provided gas reservoirs or containers. The working of the plant will be described in connection with the drawings, of which fig. 1 is a part-sectional side elevation, and fig. 2 an elevation at right angles to fig. 1.

With the parts in the position shown in figs. 1 and 2, low-pressure gas from the pipe-line will have been admitted to the top of the cylinder B through the pipes L, J, I, and open inlet valve K, and caused the piston C in that cylinder to have made its down stroke, and thereby the plunger D, compressing the gas previously admitted to the cylinder A from the low-pressure gas supply pipe L, through the pipe P, non-return valve S, and gas inlet G, and forcing it through the gas outlet H, past the non-return valve U, and through the outlet pipe T to the second pipe line, either directly or through a low-pressure gas reservoir. During the descent of the piston and plunger, the rack W will have rotated the cam X and, through the frame Y, will have moved the valve rod V downward independently of the valve stem O, and caused the wedge-shaped projection to store energy in the spring associated with the bolt until the centre of Z comes just below the centre of the pressure of the spring bolt, whereupon the bolt will act to move the valve rod downward to a sufficient extent to close the gas inlet valve K and simultaneously open the gas outlet or exhaust valve N by the action of the lever Q. As the gas pressure above the piston C will now fall considerably below the pressure in the low-pressure gas supply pipe L, gas from that pipe will flow past the non-return inlet valve S and through the gas inlet G into the lower end of the cylinder A, and cause the plunger D and piston C to make their upward or return stroke; the spent gas above the piston C being thereby displaced through the outlet F, exhaust pipe M, open exhaust valve N, and exhaust pipe R into the low-pressure gas reservoir. From this reservoir, the pressure within which will be much lower than that of the low-pressure gas delivered into cylinder B from pipe L, gas can be delivered to consumers in the district or zone to be served by the distributing station. When the piston and plunger nearly reach the end of their upstroke, the rack W will have rotated the cam X into a position in which it will have raised the valve rod V independently of the stem O of the inlet valve K and moved the centre of the wedge-shaped projection Z just above the centre of the pressure of the spring bolt. Thereupon the bolt will react, under the energy previously stored in its spring, and rapidly raise the valve rod to a further extent and open the gas inlet valve K and close the gas exhaust valve N. Low-pressure gas will then again enter the upper end of the cylinder B and cause the piston C and plunger D to make their next down stroke and compress the gas in cylinder A through the gas outlet H, past the non-return valve U, and through the outlet pipe T to the second pipe line. As will be readily understood, the above-described operations will take place automatically.



Mitchell's Booster for Long-Distance Systems.

The specification also describes and illustrates a modified arrangement.

Rotary Retorts.—No. 186,375.

MARSHALL, F. D., of Westminster, S.W. 1.

No. 14,472; May 24, 1921.

This invention relates to rotary retorts for distilling carbonaceous or other materials, and according to one feature a suitable number of depending carrier elements or internal shelves are provided and arranged round the interior of the inclined rotating cylinder or retort; one end of each element being attached to the inner face of the retort and the other end projecting inwards.

Each carrier element is suitably bent into corrugated formation so as to provide pockets which facilitate the collection of the material from the bottom of the retort, and also its elevation and showering upon the surface of the element immediately in advance of it at a point well beyond a vertical plane through the axis of the retort; thus carrying the material through and beyond the upper part of the retort chamber, where the major portion of the hot gases travel. These shelves or carrier elements may be of any suitable width; and the surface of each may, if desired, be perforated or constructed as a grid; while the pockets may be constituted by bending each extremity of the element in the same direction, the part of the carrier element between

the curved ends being curved in the reverse direction to that of the ends thereof.

To stabilize the depending carriers, the ends of each section may be connected together with plates. These form stiffeners, and at the same time act as baffles which serve to force the heating gas to the sides of the retort, where it is most needed. Each set of baffles may comprise four depending and tangentially arranged shelves or plates of the character above described, and may be disposed in the same plane and at equal distances apart round the periphery of the retort. Any suitable number of such sets of shelves may be provided along the length of the retort; each set being spaced apart from the next, and the several sets being preferably staggered relatively to each other. The shelves, instead of being attached in a direct line with the sides of the retort, may be constructed to follow the curvature of the sides, so that, taken as a whole, the shelves form portions of a spiral. This imparts a twisting motion to the heating gases, as well as showering the material in a more effective manner. Alternatively, the shelves may be continuous—that is to say, they may extend from end to end of the retort.

According to a further feature of the invention, means may be provided between each separate set of carrier elements or internal shelves (or at the inlet end of the retort) for the purpose of acting as a further baffle for the heating gases. This may be a propeller or the like of any suitable shape which will serve to break-up the direct stream of heating gases (producer or water gas) and impart a whirling motion thereto. These propellers may be attached to the interior face of the retort by means of brackets; the arrangement being such as to leave sufficient space for the carbonaceous material under treatment to pass freely between the propellers and the inner face of the inclined retort. By providing vanes or propellers as above described, not only is a whirling movement imparted to the heating gases, but they also serve to arrest and deposit the dust which is travelling from end to end of the inclined retort.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Oct. 18.]

Nos. 27 213 to 27,960.

APPLEBY, E. G.—"Gas-producers, retorts, &c." No. 27,821.
BENNETT, W.—"Dip-pipes of gas-retorts." No. 27,218.
BENTLEY, G. H.—See Appleby, E. G. No. 27 821.
BERG, E. & W.—"Gas production." No. 27 425.
BROCKWAY, F. G.—"Incandescent gas-burners." No. 27,744.
CARTWRIGHT, D. & G. H.—"Gas-mantle." No. 27 633.
GARBARINI A.—"Radiating incandescent gas heaters" No. 27,714.
GAS LIGHTING IMPROVEMENT COMPANY, LTD.—"Devices for lighting pipes, cigars, &c." No. 27 847.
GLOVER, W. R., AND GLOVER & CO., LTD., T.—"Gas, &c., taps." No. 27,429
HELPS, G.—"Gas-cookers." No. 27,516.
HUCKS, H. L.—See Gas Lighting Improvement Company, Ltd. No. 27 847.
JOHNSON, C.—"Combined gas-ring, fire-lighter, and iron-stand." No. 27 372.
LANGDON, E.—"Gas-meters." No. 27,454.
REPUBLIC FLOW METERS COMPANY.—"Flow-meters." Nos. 27,285, 27 286.
ROGERS, F. H.—See Republic Flow Meters Company. Nos. 27,285, 27,286.
ROUCKA, E.—"Apparatus for measuring a flowing medium." No. 27,679.
RUSDELL, W. J.—"Liquid column internal combustion pumps, compressors, &c." No. 27,443.
SOUTH METROPOLITAN GAS COMPANY.—See Langdon, E. No. 27,454.
STANIFORTH, H.—"Means for illuminating streets, factories, &c." No. 27,710.
WINTERLING, W. F.—"Time-controller and lighting devices." No. 27,316.

[Extracted from the "Official Journal" for Oct. 25]

Nos. 27,961 to 28,715.

BRADING, H. G.—"Machine to give change with prepayment gas-meters &c." No. 28,692.
CARPENTER, C. C.—"Purification of coal gas." No. 28,605.
CURETON, A.—"Combined press and retort for manufacture of coke." No. 28 167.
DIXON, L.—"Gas-burners." No. 28,140.
DOLPHIN, J.—"Valves for regulating passage of gas." No. 28,666.
DURAND, E.—"Gas, &c., valves." No. 28,564.
GARRETT, P. A.—"Velocity or pressure regulated valve for controlling flow of liquids and gases." No. 28,695.
GENERAL GAS APPLIANCES, LTD.—"Gas-burners." No. 28,140.
GUTTERIDGE, H.—"Slide-rules for gas-consumption calculations." No. 28 108.
HINETT, A. G.—"Incandescent gas fittings." No. 28,119.
HOWLETT & CO., LTD., M.—See Dolphin, J. No. 28,666.
JENKS, A. E.—"Incandescent gas-fires." No. 28,470.
MACCONOCHIE, A. F.—"Dry centrifugal gas-cleaner." No. 28,424.
MAJOR, P. F. E.—"Gas and electricity meters, &c." No. 28,556.
MILES, G. H.—See Major, P. F. E. No. 28,556.
MOORE, G. E.—"Rotary meters." No. 28 294.
NEATH, E.—"Manufacture of gas from coal and oil." No. 28 459.
OGDEN, W.—"Regenerative flues for gas-retorts, ovens, &c." No. 28,126.
ROWLSON, B.—See Cureton, A. No. 28,167.
SMITH, C. COATES.—See Major, P. F. E. No. 28 556.
SOUTH METROPOLITAN GAS COMPANY.—See Carpenter, C. C No. 28,605.
SPENCER, S. E.—"Grids for gas-purifiers." No. 27,970.
SUGG & CO., LTD., W., and SUGG, P. H.—"Geysers." No. 28,601.
SUGG & CO., LTD., W., and SUGG, P. H.—"Gas and water taps for geysers, &c." No. 28 602.
SUPREME OIL STOVE AND BURNER COMPANY, LTD.—See Jenks, A. E. No. 28,470.

MISCELLANEOUS NEWS.

THE AMENDED MODEL GAS BILL.

The Model Bills and Clauses (as amended) 1922, which have been issued as a Parliamentary Paper (price 5s.), include the Gas Bill, in which certain amendments to the 1921 form have been made and some new clauses added.

Clause 14 *(Power to Create a Reserve Fund)* has been altered so that the sum set aside "may be invested in any investments in which trustees are authorized by law to invest money, or in such other manner as shall be authorized by a resolution of the company."

Clause 30 *(Expenses of Re-connecting Discontinued Supply)* has been amended so that in cases in which, in consequence of any default on the part of the occupier of any premises, the company have cut off the supply of gas, and the occupier desires to resume the supply, the company shall not be under any obligation to supply gas to such occupier "until he shall have made good the default and paid such expenses."

The following new clauses have been inserted.

Clause 27 *(As to Mains of Insufficient Capacity).*

Notwithstanding anything contained in any enactment to the contrary, the company shall not be obliged to give from any main a supply of gas for any purpose other than lighting or domestic use in any case where the capacity of such main is at the date when such notice is served insufficient for such purpose or if, and so long as, any such supply would in the opinion of the company interfere with the sufficiency of the gas required to be supplied by means of that main for lighting or domestic purposes.

Clause 29 *(As to Mode of Cutting-off Supplies).*

(1) In any case in which the company are by virtue of any enactment relating to their undertaking authorized to cut off and discontinue the supply of gas to any premises in consequence of any default on the part of the occupier of the premises, it shall be lawful for the company without prejudice to any other remedy which may be lawfully available to them to disconnect at the meter the service-pipe (whether belonging to the consumer or to the company), and any person who shall re-connect such service-pipe with the meter without the consent of the company shall be deemed to commit an offence within the meaning of section 18 of the Gas-Works Clauses Act, 1847.

Provided that if, and so soon as, the matter complained of shall have been remedied nothing in this section shall prejudice or interfere with any rights vested in any person by virtue of section 11 of the Gas-Works Clauses Act, 1871.

(2) For the purposes of this section the company, subject to the provisions of section 22 of the Gas-Works Clauses Act, 1871, shall have, and may exercise, the like powers of entry as are exerciseable under that section.

Clause 34 *(Power to Lay Pipes for Ancillary Purposes).*

The company may within the limits of supply lay down and repair, take up, relay, or renew mains, pipes, and culverts for the purpose of procuring, conducting, or disposing of any oil or other materials used by them in, or resulting from, the manufacture of gas or any residual products thereof, or for any purpose connected with their undertaking; and the provisions of the Gas-Works Clauses Act, 1847, with respect to the breaking-up of streets for the purpose of laying pipes and for the protection of pipes when laid, so far as they are applicable for the purposes of this section, shall extend and apply *mutatis mutandis* to and for the purposes thereof.

METER TESTING IN MANCHESTER.

The City Justices' gas-meter testing station in Manchester was visited last Thursday week by about 100 members of the Manchester Rotary Club. The visit was the sequel to an address which had been delivered that day at the weekly dinner of the club, at the Grosvenor Hotel, Deansgate, by Mr. H. N. Barrow, the Chairman of the Committee of Magistrates who have control of the meter-testing station. Mr. S. Dyson (Inspector) and Mr. H. Gollings (Assistant Inspector) showed the visitors the methods and appliances in use at the station, which has the reputation of being first in the United Kingdom in the matter of equipment for its work, and is probably unsurpassed by any other testing station in the world.

At the conclusion of the visit, Mr. Frederick Foxall (the President of the Manchester Rotary Club) gave thanks to Mr. Barrow for allowing his fellow Rotarians to see a building so finely equipped for its purpose, and for the interesting information so kindly given them. Mr. Barrow said it had been a pleasure to him and the staff to show the visitors round. It was well that the public should know what careful means were taken to protect the gas consumers. Where the gas supply was in the hands of the municipality, as in Manchester, the Magistrates acted as an independent authority, to see that all the meters sent out for use were true recorders. At this station, between 4000 and 5000 meters were tested in the course of one month. While on this subject of gas-meter testing, he could not help saying that it would be only right and proper to have an independent test applied to electricity meters. Mr. Barry (of Messrs. Braddock's meter works, Oldham) spoke of the infinite pains that are taken by meter makers to render them correct. Seeing that the makers gave a five years' guarantee with each meter, it was obviously to their interest to have the meters accurate. They were now engaged upon an automatic arrangement in connection with the most delicate parts of the meter which will do away with the human element altogether. As to the future of gas, he had no fear. Gas was more alive now than ever it was; and by its uses for heating, cooking, and industrial work, the gas undertakings secured a day load as well as a night load.

Gas Prices at Padiham.—Mr. Wiggins reported at a meeting of the Padiham Urban District Council a reduction in the price of gas, and added that during the next year they hoped to be able to make a further concession. This, however, would depend upon the coal market. The price is now down to 4s. per 1000 c.ft.

GAS REGULATION ACT ORDER.

The Director of Gas Administration has forwarded a copy of the following further Order made by the Board of Trade under section 1 of the Gas Regulation Act.

Ashton-in-Makerfield Urban District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 18d. per therm.

Prepayment meter clauses are included. (Nov. 2.)

AN ENGLISH COMPANY ABROAD IN PEACE AND WAR.

Some notes were reproduced in the "JOURNAL" of Aug. 23 last (p. 430) from a serial account in the Bournemouth Gas and Water Company's "Co-Partner" Magazine of the work of the Imperial Continental Gas Association under peace and war conditions. The author is Sir Charles Jessel, Bart., the Chairman of the Association, with which he has been connected for over a quarter-of-a-century. He is also a Director of the Bournemouth Gas and Water Company. The first instalments dealt mainly with the early history of the Association, but a later one touches upon the war period.

From its humble birth in 1824, when a gas-works of 25,000 cub.m. per day capacity, with two single-lift holders of 33 ft. diameter and 16 ft. height of lift, with wooden guides, was considered ample for the supply of a large town like Hanover, the Imperial Continental Gas Association, despite the many difficulties surrounding an essentially English undertaking with 98 p.ct. of its shareholders of British nationality, working entirely abroad, grew in strength and prosperity. The crowning achievement, which gave the Association a world-wide reputation, was the planning and erection at Mariendorf of the fourth works necessary for the supply of Berlin. On land of 192 acres in area, the first section of the works was erected. It had a daily capacity of 4½ million c.ft., and cost over £520,000. The plant comprised twelve such sections. In the year 1913, at the stations directly controlled from London, 983,754 tons of coal were carbonized, producing 12,095 million c.ft., and yielded a balance-sheet profit of £520,000. Thus for nearly ninety years of their existence the Association had been little affected by Continental wars and revolutions.

The war of 1914 placed Brussels, Antwerp, and Lille under German control and occupation. Armentières and Estaires, and Pont-à-Mousson were knocked to pieces by German guns, and Nancy was bombarded by long-range guns and copiously bombed from the air. Fortunately in their establishment at Flushing the Association possessed a channel of which valuable use was made from time to time. Even before the black clouds of war began to loom upon the horizon, two very important matters had received the earnest attention of the Board —namely, the supply of coal to the stations and the gathering-in and remittance of money to London. Efforts in these directions had such good effect that as regards coal, when war was declared, and the German army had broken into Belgium, the Association had stocks sufficient at Berlin for twenty-two weeks, at Brussels for seventeen, and at Antwerp for ten. The smallest stations had equally satisfactory provision. As regards funds they were also very fortunate. Cash and liquid securities in hand enabled them not only to carry on during the whole period of the war, maintaining the service of the debenture capital, but to have a very ample margin. In cash and bills, apart altogether from investments, the Association had command of £499 406.

On Aug. 29 it was reported that Brussels was entirely cut off owing to military operations by the Germans. The authorities of the City of Antwerp, fearful that the supply of gas might give out, were pressing the Association to rush in further supplies of coal; and the collieries and other contractors, notwithstanding the risks they ran, agreed to send coal to Antwerp as long as the port was open, charging only 9d. per ton over the contract price of 15s. 9d. per ton delivered. It was not long, however, before the port was closed. On the night of Wednesday, Oct. 7, 1914, the Germans bombarded the city, and no less than forty shells fell upon the Bercham works, which were in the line of fire, killing two of the workmen. The damage done was not commensurate with the expenditure of ammunition; for within twenty-four hours of the bombardment, with readiness and resource which did them infinite credit, M. de Vigne and M. Bousin, Assistant Engineers, and others who had remained at their posts, succeeded, at the request of the Belgian Civil Authorities, in reinstating the supply of gas; the rapidity with which this was done eliciting commendation from the German authorities. The action taken by the Association's Accountant in Antwerp in burying the collectors' securities and the most important books and papers, getting through a large remittance to London, and taking away to Holland all the cash on which he could lay hands, would certainly not have elicited commendation from the German authorities, though much appreciated by the Board of Directors of the Association.

The Germans assumed entire control of the Association's undertakings in Belgium, and as a proof of their determination to annex that country formed a German Gas, Electricity, and Water Company, to which the Association's establishments were sold for the benefit of the German Reich. When they made up their minds to scuttle in November, 1918, the principal officers of the Association retook possession within twenty-four hours. During their occupation, a good deal of damage was done by the Germans. Meters were broken to pieces for the tin and brass in them, the copper lantern frames broken up and utilized, and other acts of sabotage committed.

Further Reduction at Reading.—The Reading Gas Company have given notice that the price of gas will be reduced from the Michaelmas quarter meter readings. This is the third reduction in price this year; the price having been reduced by 1½d. per therm, which is equivalent to a decrease of over 5½d. per 1000 c.ft.

VENTILATION AND ATMOSPHERE.

The above was the subject of the first lecture in London this session arranged by the Chadwick Trust, which was formed to commemorate the great work in the teaching of hygiene done by Sir Edwin Chadwick in the Nineteenth Century. The chair was occupied by Sir WILLIAM J. COLLINS, K.C.V.O., M.S., M.D., B.Sc., F.R.C.S. (Chairman of the Chadwick Trustees), and the lecture was delivered by Prof. LEONARD HILL, M.D., F.R.S., at the Royal Institute of British Architects Building, Conduit Street, W.

Prof. HILL said that the body was fashioned by nature for the getting of food by active exercise, and upon the taking of exercise depended the proper vigorous function of the digestive, respiratory, and vascular organs. Consequent upon this, too, was the vigour of the nervous system and keen enjoyment of life. Out of doors the skin was cooled and dried by the wind; the wind freely ventilating the clothes. The skin was also warmed by the radiant energy of the sun; and this actively caused evaporation. These to-and-fro changes of the skin's condition made for health. An environment of over-warm, stagnant, and moist air was contrary to the naturally changing conditions which occurred out of doors. He emphasized the fact that it was not the relative humidity that mattered, but the actual vapour pressure of the air coming in contact with the skin. The breathing of cool air entailed greater evaporation from the respiratory membrane than the breathing of warm, moist air, thereby making for health; and he gave figures of mortality from respiratory diseases in agricultural and industrial districts in order to show how bad ventilation increased mortality.

The most important thing of all, from the point of view of health, next to the choice of a properly balanced diet, was the atmospheric condition, and the conditions of muscular exercise in the open in which a person lived. The first thing to deal with in connection with ventilation was infection from persons carrying active diseases; and the lecturer described experiments carried out with a view to showing how microbes were destroyed by proper ventilation. Wet bulb temperatures in factories and mines were physiologically more important than dry bulb temperatures, and vapour pressures more important than relative humidity; but the velocity of the movement of the air was most important of all, for on this chiefly depended cooling by convection and evaporation.

Prof. Hill, some time ago, introduced the Kata-thermometer, a large-bulbed spirit thermometer, for determining the cooling power of an atmosphere as due to evaporation, radiation, and convection. This could not be done by the ordinary dry bulb thermometer. By keeping the cooling power in proper relation to the work done and the heat output of the worker, the latter could be kept from sweating, and working with comfort and ease, naturally stimulated to greater production. In demonstrating the Kata-thermometer, the lecturer said that the movement of the air was more important than the actual temperature, because this brought about evaporation more than anything else. The Kata-thermometer was calibrated from 95° to 100° Fahr. It was placed in hot water until the spirit rose to the top bulb, dried, and then, with a stop watch, they measured the time taken for it to drop from 100° to 95°. There was also a wet bulb Kata-thermometer, for use in hot, moist atmospheres. Every Kata thermometer was made of standard size; so that one was comparable with another. Each had a factor number, and by dividing the number of seconds taken for cooling into the factor number they obtained the cooling power of the air. He also exhibited an electrical Kata-thermometer, and referred to a new recording Kata-thermometer which is being completed.

In the course of his lecture, Prof. Hill gave instances of good results attending careful regard to ventilation and atmosphere in factories. Among these he mentioned an English steel-tube drawing shop, where clusters of large air-ducts had been installed over the heads and to the side of the workers in front of the furnaces. The air current from these was so great that when the furnace doors were shut one felt too cold, and moved away. The men were warmed by the radiant energy and cooled by the wind alternately, as they drew the tubes from the furnace and paused. The effect was as congenial as the sun on a breezy day coming in and out from clouds. The output of this factory was stated to be greater than any other of the kind, and industrial unrest was unknown there. The ventilation of furnace rooms, engine rooms, &c., by fans placed at the bottom of wide trunks down which the cool air naturally sunk—the fan breaking-up the air into fine streams—was advocated by the lecturer. As an example of bad ventilation, he referred to an office in which the atmosphere was stagnant. The workers frequently complained, and absences through sickness were frequent. The chemical purity of the air was unassailable; but the fault lay in the low cooling evaporative power and in stillness and monotony.

Radiant heat from gas or coke fires, or warmth from heating coils, said the lecturer, to warm the floors and walls of rooms, and open windows or a system of fans to impel cool, fresh air through gratings about 8 ft. from the ground and extract it through the ceiling, according to the size of the room or hall, were the best methods of heating and ventilating. Expensive plenum systems were not wanted. There must, however, be proper control by a skilled attendant of heating coils, open windows, and extract fans in offices, shops, and workrooms of all classes. They had heard a man say that he earned his living by the sweat of his brow; but sweating could be done away with by getting air with the proper cooling power, which could be determined by the Kata-thermometer.

Board of Trade and a Therm Charge Inquiry.—Replying at last week's meeting of the London County Council to a question by Mr. W. C. Johnson, Mr. Ernest Sanger (the Chairman of the Public Control Committee) said he understood that the Board of Trade proposed to hold an inquiry into the present method of charging for gas.

Baillieston Gas Undertaking.—A Special Committee of the Glasgow Corporation appointed to consider and report relative to the offer by the Baillieston Gas Light Company to sell their gas undertaking to the Corporation, have had several meetings with the Directors of the Company, when the whole matter was fully discussed. The Company have now withdrawn their offer.

CURRENT SALES OF GAS PRODUCTS.

Tar Products in the Provinces.

Nov. 6.

The average values for gas-works products during last week were: Gas-works coal tar, 67s. 6d. to 72s. 6d. Pitch, East Coast, 115s. to 118s. f.o.b. West Coast—Manchester, 105s. to 107s. 6d.; Liverpool, 106s. to 109s.; Clyde, 107s. 6d. to 110s. 6d. Benzole 90 p.ct. North, 1s. 9d. to 1s. 10d.; crude 65 p.ct. at 120° C., 1s. 1½d. to 1s. 2½d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 10d. to 1s. 11d. Toluole, naked, North, 2s. to 2s. 3d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9¼d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 2s. to 2s. 1d. Creosote, in bulk, North, liquid, 6½d. to 6⅝d.; salty, 5½d. to 5⅝d. Scotland, 4⅞d. to 5d. Heavy oils, in bulk, North, 6¼d. to 6½d. Carbolic acid, 60 p.ct., 2s. to 2s. 1d. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

There is not much fresh to report in the tar products markets. The feature is still the strength of pitch, which has crossed the £5 per ton mark in several districts. The Continental demand remains fairly insistent, and a number of shipments are being made. Prices range from 97s. 6d. to 102s. 6d. per ton. There is a moderate demand for tar, and benzole keeps much about as last reported. Solvent naphtha continues to improve, and now makes 2s. 4d. per gallon; this being due to the better situation developing in the rubber manufacturing industries. Heavy naphtha is unchanged. Cresylic acid shows irregularity; but carbolic acid tends to improve, especially crystals, which now command 7d. per lb., while crude 60's remain at 2s. per gallon. Creosote is unaltered from 6½d. per gallon. Intermediate products continue firm, particularly on the export side; but there is no alteration from prices last quoted.

Sulphate of Ammonia.

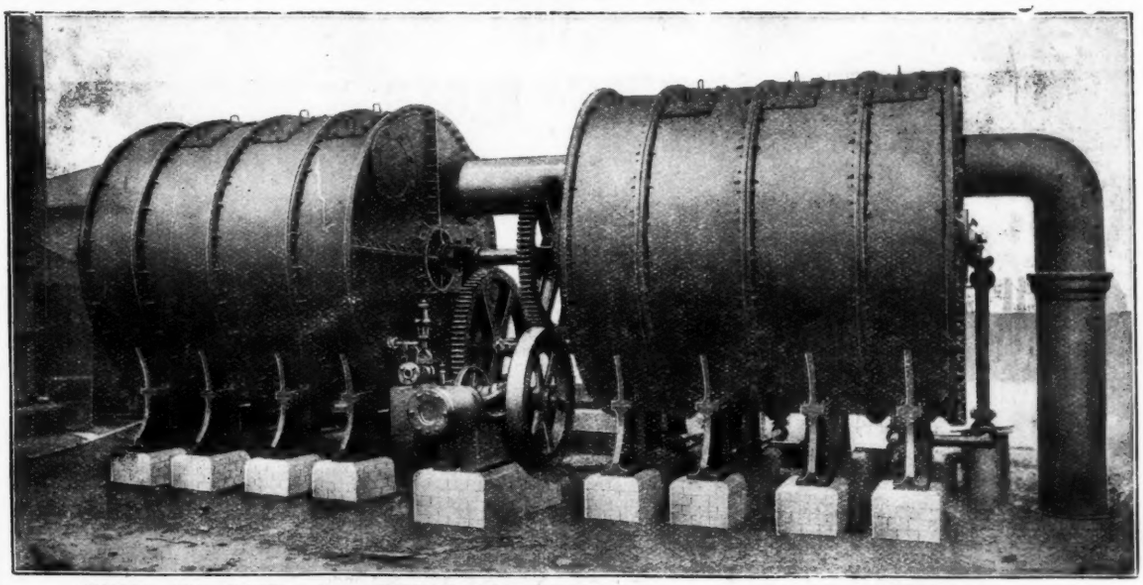
There is no change in the situation. The shortage continues to increase, and, unfortunate as it may appear for this industry which did so much for agriculture in the years of war and immediately afterwards, there is bound to be some part of the trade diverted to nitrate of soda, of which there are fairly plentiful supplies immediately available. France and Belgium are not producing sufficient sulphate for their own current needs, and are endeavouring to import from us; while Germany, owing to the enormous costs of producing nitrogen synthetically, is having to fall back on the almost equally expensive expedient of importing nitrate of soda from Chile. This world-wide shortage, and consequent call on the English market for sulphate, must produce higher prices in the near future; and it would be as well if agricultural merchants and others placed their orders as early as possible, as suggested by the British Sulphate of Ammonia Federation, so that the probable requirements of next season may be gauged; otherwise there is much likelihood that many will go short.

Tribute to the Late Sir George Livesey.

While in London seeking information regarding the industry, a deputation from the municipal gas undertaking of Pilsen, with other representatives of the gas industry in the new state of Czecho-Slovakia, expressed a desire to lay a wreath on the grave of Sir George Livesey, as a token of respect and admiration of his work. They explained that their democratic people had shown great interest in his co-partnership work. Accordingly, on Oct. 25 the party proceeded to Old Kent Road, where they were received by the President of the South Metropolitan Gas Company (Dr. Charles Carpenter) and the General Manager (Mr. F. M'Leod), and after examining the Livesey statue they were conducted to Nunhead Cemetery, where Mr. N. V. Kopp (the President of the Pilsen Gas Committee) placed a magnificent wreath on the stone slab, and gave a short address, which is reproduced in the South Metropolitan Company's "Co-Partnership Journal." In the course of this, Mr. Kopp declared that England is far ahead of any other country in regard to gas, and that Sir George Livesey was one of the most famous men in the gas world. In reply, Dr. Charles Carpenter (with whom was Mr. Frank Bush) said that Sir George was a great gas engineer and a great administrator, but beyond his greatness as an engineer and administrator stood his work as a great social reformer. His great social reform was to change the relations between master and man, and to put them on a new foundation of co-partnership. The Company believed that the future progress of any country was impossible unless what were called the "working classes" progressed too. He hoped that co-partnership might be established in Czecho-Slovakia.

Gas Prices at Oswaldtwistle.—It was reported recently to the Oswaldtwistle District Council that the Ministry of Health had written respecting a proposed loan of £7000 for gas-main extensions. It was decided to amend the application, and to borrow £5390, instead of £7000. Mr. T. Usher (the Chairman of the Gas Committee) said Oswaldtwistle was in a unique position. Had it not been for the war, he had no doubt that the price of gas would have been reduced to 1s. 6d. per 1000 c.ft., in accordance with the ambitions of the Gas Engineer (Mr. J. H. Davies). It was decided to reduce the price 6d. per 1000 c.ft. from Sept. 30 last, and that prepayment meter consumers be allowed 26 c.ft. for 1d.

ROTARY SCRUBBER WASHERS



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Fractured Gas-Main Fatality.—A woman and her son have died at Stafford from gas poisoning, while other persons were more or less seriously affected. An escape of gas had been noticed; and it is believed that a main had been fractured through a steam-roller passing along the road.

Slot-Meter Theft.—At Doncaster, Edwd. S. Ottway and Alfred Collier, pit pony drivers, 16 years of age, were charged with stealing 7s. 9d. from a slot gas-meter in an unoccupied house. Ottway had a bad record, and was at present bound over for similar offences. There were six previous convictions against him. He was remanded with a view to his being sent to a Borstal Institution; while Collier, regarding whom there were no previous complaints, was bound over.

Meter Testing in London.—Without comment, the London County Council last week adopted a recommendation of the Public Control Committee to approve of an estimate of expenditure on capital account of £900, submitted by the Finance Committee in respect of the digging of trial holes, the preparation of working drawings, bills of quantities, surveyors' fees, &c., in connection with the proposed erection of a new gas-meter testing office at Helmet Row, Finsbury.

Irish Gas Strikes.—Workmen employed at Ballymena Urban Council Gas-Works went on strike because of the dismissal of a fellow employee for failing to carry out orders. The Gas Committee refused to reinstate the man. It is understood, however, that the public lighting can be maintained for a considerable time, owing to the operation of the recently installed vertical retort system. The services of a few temporary hands were secured to keep the plant going. Some members of the Sheet Metal and Gas Meter Workers' Union in Ireland, employed by the Alliance and Dublin Consumers' Gas Company, went on strike as a protest against the dismissal of six of their number, the importation of gas-meters, and a proposed reduction of 14s. 6d. per week in wages.

Applications of Gas.—Before the Doncaster Rotary Club recently, Mr. Robert Watson (the Corporation Gas Engineer and General Manager) gave an address on "Applications of Gas," in which he made a survey of the history of gas since its first use. Speaking to business men, it was of interest to be able to show that the first man in Doncaster to use gas was George Elliott, a whitesmith, of St. Sepulchre Gate, who lighted his premises with it in 1814. Mr. Watson reminded his hearers that most complaints of poor gas were due to low pressure caused by dents in the pipes, by dust clogging burners, or by other defects which were really the fault of the consumer. Mr. W. Clark (a former Chairman of the Gas Committee), in the course of the discussion, said Doncaster was one of the first towns in the country to offer its plant to the Government for the extraction of materials for making war munitions. This valuable work led to depreciation in the plant from a gas-making point of view; and the works were only just recovering from this. Mr. Clark said in Mr. Watson they had one of the recognized gas experts of the country.

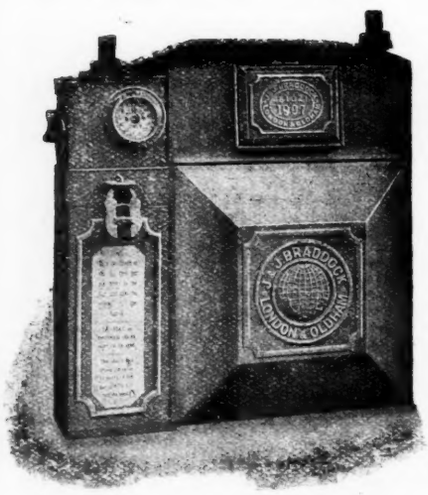
Buxton Gas Accounts.—The annual accounts of the Buxton gas undertaking show a gross surplus on the year's working of £6497, as against £7730 for the previous year. The net profit was £2303, and the balance of the reserve and renewals fund, after transferring £1600 in aid of the district rate, was £2005. The total capital expenditure was £80,029, in respect of which £14,440 loan debt is outstanding. Deducting from this sinking fund accumulations amounting to £2724, the net debt is £11,716, or 14·64 p.ct. of the total expenditure.

Public Lighting of Sheffield.—In reply to questions by Mr. Bancroft, of the Sheffield Watch Committee, Alderman Cattell replied that the number of street-lamps inside the city boundaries is 12,403, and the number lighted at the present time 9488. The lighting of each round occupies 75 to 90 minutes. The principal thoroughfares are always lighted first and extinguished last, and therefore of necessity some of the streets must be last to be lighted. The Chief Constable and Lighting Superintendent, in accordance with certain instructions from the Watch Committee, are responsible for deciding what lamps shall be left unlighted.

Clean Air and Health.—A meeting under the auspices of the Leeds Smoke Abatement Committee was held at the Town Hall, under the chairmanship of Sir Rowland H. Barran, when Prof. Leonard Hill (Director of the Department of Applied Physiology, Medical Research Council) was the lecturer, and spoke on "The Relation of Clean Air to Health." His observations were illustrated by lantern slides showing the disparity between conditions in clear atmosphere and in smoke-polluted areas. He compared the high death rate of the towns with the low rate of agricultural workers, and said that among the working classes of modern industry 270,000 years of working time were lost every year through sickness. He advocated the use of gas-fires in the home and of coke for cooking. The whole problem, he said, was to so use coal that one could get the maximum of gas and use the coke and bye-products. If this were done, the coal raised would have three times the energy and value now obtained from it.

Colwyn Bay Gas-Works Extensions.—At a Ministry of Health inquiry regarding a proposal by the Colwyn Bay Urban District Council to spend some £40,000 upon the enlargement and improvement of their gas-works, the Clerk (Mr. J. Amphlett) said the expenditure was rendered necessary by the rapid development of the urban district and also the forthcoming extension of the boundaries by the inclusion of the parish of Llysfaen. It was further stated by Mr. J. Smith (the Gas Engineer) that an application had been received for a supply of gas and electricity to the parish of Penrhyn. The scheme includes the erection at Bronynant of a new power house, a holder and tank, and condensers and washers, and the laying-down of a high-pressure main. The latter will be the first main of the high-pressure type to be provided on the North Wales coast, and will carry a pressure of 25 lbs. to the sq. in. The manufacturing capacity at the works will be adequate for the present when the additional storage is available. No opposition to the loan was offered.

BRADDOCK'S PATENT "SLOT" METERS.



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POSITIVE GEARING.

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Telegrams—"METRIQUE, LAMB LONDON." Telephone No. 2412 HOP.

Gas Cheaper at Buckie.—The price of gas at Buckie is being reduced from 7s. 11d. to 7s. 6d. per 1000 c.ft. for lighting, and 7s. 1d. for cooking, heating, and motive power.

Burton-on-Trent Gas Undertaking.—At Burton-on-Trent, last Wednesday, Mr. A. W. Brightmore held an inquiry concerning an application by the Corporation to the Ministry of Health for permission to borrow £36,100, for the purposes of their gas undertaking. The principal item in the application was that of vertical retorts; and it was stated that the estimated expenditure had been exceeded by £20,198, mainly through increased rates of wages and prices of material. As to the other items in the application, the cost of these would have been met out of revenue, but for the diminution of receipts owing to the coal strike. The Gas Manager (Mr. W. Wilson) informed the Inspector that through the work which had been carried out considerable benefit in the form of an improved service of gas had accrued to the public.

Vertical Retort Operators' Conditions.—A letter was recently received by the Glasgow Corporation Gas Sub-Committee from the Secretary of the Municipal Employees' Association, asking, on behalf of the vertical retort operators at the Provan Gas-Works, that the number of retorts be reduced from twenty-four to sixteen per operator, and also that a deputation of the men concerned be received in support of this request. The Sub-Committee, after consideration of a report by the General Manager as to the number of retorts operated per man in other large undertakings, and as to the steps already taken, and proposed to be taken, by him to make the conditions more comfortable for the operators, agreed to recommend that the request for a reduction of the number of retorts per operator be not entertained, and that it is unnecessary to receive the deputation.

The General Purposes Committee of the Darwen Town Council have considered the question of gas prices. It was found impracticable to make any reduction at the present stage, and the whole subject was adjourned for a period of three months.

In the Accrington Town Council complaints were made of the pressure of gas, and the consequent inferior lighting in the streets and houses. Alderman Dewhurst said the pressure was not at fault, but the service-pipes; and the Committee could not help this. Mr. Dickson remarked that they had found cases where the pipes were so badly corroded that the gas was escaping.

In connection with the South Birmingham shopping week, which was extremely successful, the City of Birmingham Gas Department sent for the procession a motor lorry fitted up with gas cookers and fires surmounted by a miniature gas-works, and also a horse vehicle on which effective use was made of the phrase "Burn gas coke in every home." Tiny captive coloured balloons added to the effect. The shopkeepers showed an enthusiastic interest in the movement, and not for many years have their premises been so well illuminated. The Department undertook the cleaning of all burners, and loaned outside lamps free of charge.

Thirty-one lamplighters have been thrown out of employment by the installation of automatic lighters in street-lamps at Cardiff.

The Wallasey Corporation propose to apply to the Ministry of Health for sanction to borrow the sum of £12,000 for the purchase of gas-cookers to be let out on hire.

The Directors of the Monte Video Gas and Dry Dock Company, Ltd., have declared an interim dividend on the ordinary stock for the half year ended June 30 last of 2 p.ct. (actual), free of income-tax, payable on Dec. 1. This is the same as in the previous year.

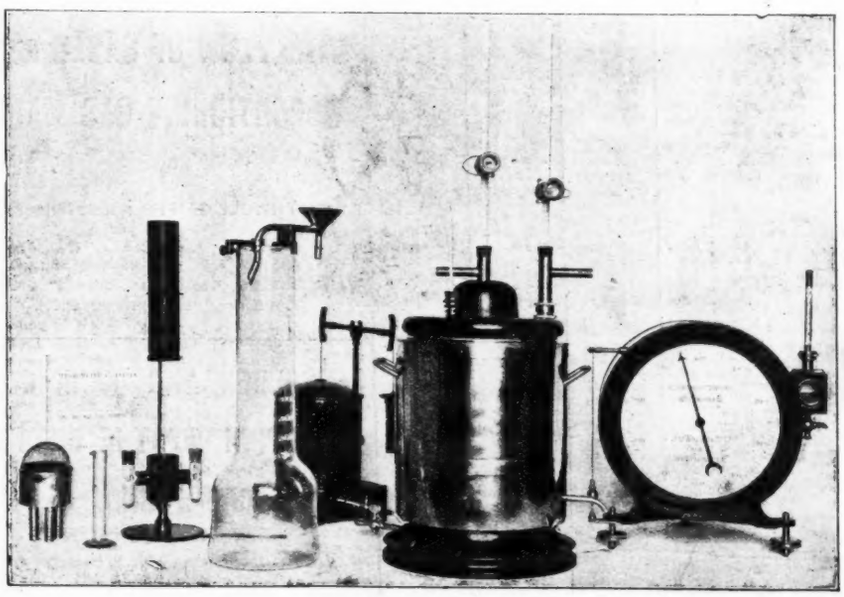
Messrs. Leslie Allan and Co. (South Wales), Ltd., is the title of a private company registered, with a capital of £10,000, to carry on business as manufacturers and distillers of, and dealers in, tar and petroleum products, &c. The office is at Gloucester House, Swansea.

A verdict of "Accidental death" was returned last Thursday week at an inquest on Thomas Hallam, of Oldbury, a riveter's holder-up, employed by Messrs. Edwin Danks and Co., boiler makers. Hallam was engaged at the Nechells Gas-Works, Birmingham, and was killed as the result of a fall while following his employment.

A neat little note tablet, leather bound, which does not take up much room in the pocket, has been forwarded to us by West's Gas Improvement Company, Ltd. Inside the cover it states that "the Glover-West System gets the most out of the coal." On the other inside page of the cover, it is stated that refills will be supplied with pleasure by the Company. Otherwise there is no advertisement on this useful little companion.

Messrs. A. & W. Richards, of 37, Walbrook, E.C., notified in our advertising columns last week the sale by tender of 400 £10 new ordinary shares and £1000 of 6 p.ct. redeemable mortgage debentures in the Welwyn, Knebworth, and District Gas Company, Ltd. The ordinary shares will rank for a maximum dividend of 10 p.ct. equally with the existing original shares now receiving that rate. At the minimum price of issue of £12 10s. per share, the yield will thus be 8 p.ct. The debentures (minimum price of issue par) are to be redeemed at par on Dec. 31, 1932. The establishment of the Welwyn Garden City, partly in the area of the Company and partly in that of the Hatfield Gas Company, Ltd., has resulted in a very substantial increase in the output of gas. Last year the sales of the Welwyn Company, apart from the Garden City consumption, were 17,780,000 c.ft., and are steadily increasing. An agreement has been concluded with the Hatfield Company for the supply of gas in bulk to the latter's consumers in the Welwyn Garden City for a period of seven years from Dec. 25, 1921; and the consumption from this source is expected to reach 3½ million c.ft. in the current year, and 6 millions by the end of 1923. For the purpose of this supply, additional manufacturing plant and mains have been installed at a cost of about £4000, for which a temporary overdraft has been obtained from the Company's bankers. The proceeds of the present issue will be utilized in the repayment of the overdraft and for further extensions.

BOYS CALORIMETER



GAS REGULATION ACT, 1920.

CALORIMETER

as prescribed

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GAS REFEREES.

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WESTMINSTER, S.W. 1.

STOCK MARKET REPORT.

THE Stock Exchange has had an even more quiet week—shorn of one day; the House being closed as usual on the 1st of November—and also repressed by some anxiety as to the fate of the Borough Elections. Cheered by the result, business improved considerably on Thursday; and most markets responded to the feeling. The advance was well maintained on Friday, and the close was quite satisfactory. The gilt-edged department was not much changed. Home Government issues were rather better on the whole, and the big four marked thus on Friday: Consols 56⅞-57⅛, War Loan 98⅜-99 1/16, Funding 86¼-87, Victory 88⅛-88⅞. Indians were a little upset by the new loan, Home Rails made a recovery, and Argentines were still in favour. The Foreign Market closed dull.

Business in the Gas Market was lighter; Gas Light ordinary and Primitiva preference being the busiest. The tone continued most satisfactory; all variations in quotations being in the upward direction. The London Companies were firm and unchanged. In the Suburban and Provincial group, Croydon sliding-scale rose 2, Newcastle debenture 1⅛, Southampton 3½, and Tynemouth 4. The Continental Companies were steady and unchanged. In the remoter world, Buenos Aires rose 2, Cape Town ½, Primitiva preference ¼, ditto 4 p.ct. debenture 2, River Plate 2, and South African ½.

The following transactions in gas during the week were recorded: On Monday, Alliance and Dublin 64½-65⅝, Bristol 90½, British debenture 76, Cape Town preference 6 5/16, 6⅜, European 10¼, 10⅜, 10⅞, Gas Light ordinary 95½, 96, 96¼, 96½, ditto maximum 62½, ditto preference 78½, ditto 3 p.ct. debenture 61½, 63, Imperial Continental 156, 157, 158, ditto 3½ p.ct. debenture 73½, Oriental 100, 101, Primitiva preference 39s., ditto 1911 debentures 55½, South Metropolitan 94¾, 96, South Suburban 98½, Southgate District 7½ p.ct. debenture 102¼, Danish 4 p.ct. debenture 69, 70. On Tuesday, British 31, Gas Light ordinary 95¼, 95½, 96, 96⅛, 96¼, ditto maximum 62½. Hastings and St. Leonards 5 p.ct. 95½, 95½, Imperial Continental 156½, Liverpool 5 p.ct. 91⅜, Primitiva 11s., ditto preference 40s., 41s., 41s. 3d., ditto 1911 debenture 56, South Metropolitan 95, South Suburban 97½, Tottenham 4 p.ct. debenture 79, Southgate District 7½ p.ct. debenture 102⅜, Aldershot 5 p.ct. maximum "C" 72. On Wednesday, the London Stock Exchange was closed. On Thursday, Commercial 4 p.ct. 94½, 94⅝, 95, Continental Union 29, ditto 7 p.ct. preference 51, 52, European 10½, 10⅝, Gas Light ordinary 95½, 95⅝, 95⅝, 96, ditto preference 79, ditto debenture 61½, 62½, Imperial Continental 157½, Primitiva 13s., ditto preference 41s. 4½d., 41s. 6d., 42s., 42s. 6d., 43s. 9d., 44s. 4½d., South Metropolitan 94½ 94⅝, 95, 95¼, 95½, ditto 3 p.ct. debenture 61½, South Suburban 97½, South Metropolitan 6½ p.ct. debenture 105, Southgate District 7½ p.ct. debenture 102½, Swansea 7 p.ct. preference 104½. On Friday, Brentford "B" 101½, Brighton and Hove original 170, Commercial 4 p.ct. 94, Gas Light ordinary 95½, 95⅝, 95⅝, 95⅞, 96, 96⅛, ditto maximum 62½, ditto preference 79, ditto debenture 62, 62½, Imperial Continental 157, 157½, Primitiva 11s. 6d., 13s., 13s. 6d., ditto preference 43s. 9d., 45s., 45s. 7½d., 45s. 9d., 46s., 46s. 3d., 46s. 10½d., South Metropolitan 95, 96, South Suburban 98⅛, Tottenham "B" 100, 101, Aldershot 5 p.ct. maximum "C" 72½.

In the Money Market, the position opened very firm, and the pressure intensified next day into a large demand, which continued more or less until the close. Discount rates held a steady course up till Friday, when they became considerably harder. Silver was much disturbed by persistent sales; and the price fell steadily, until it culminated on Friday in the exceptionally low figure of 33 13/16d. The Bank of England rate was 3 p.ct., as fixed on July 13.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.cs.					
182,049	Stk.	Aug. 24	4	4%	Aldershot 4 p.c. Pref.	..	68—73	...
1,551,868	,,	Oct. 5	2½	5%	Alliance & Dublin Ord.	59—64	62—67	64½—65⅝
374,000	,,	July 13	4	4%	Do. 4 p.c. Deb.	76—79	60—65	...
280,000	5	Oct. 19	7½	4/-	Bombay, Ltd.	5⅛—6⅛	4¼—5	...
100,000	5	Aug. 10	16	7½%	Bourne-mouth Gas and Water — B 7 p.c.	..	11—12	...
383,110	10	,,	7	7%	Bourne-mouth Gas and Water — Pref. 6 p.c.	15—15½	10½—11½	...
115,000	10	,,	6	6%	Bourne-mouth Gas and Water — 4 p.c. Deb.	13½—14	8—9	...
162,065	—	June 29	—	4%		..	73—78	...
992,045	Stk.	July 27	14	6½/-	Brentford A Consolid.	261—266	100—105	...
734,920	,,	,,	11	6½/3	Do. B New	204—209	100—105	101½
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	82—87	...
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	75—80	...
214,775	,,	Aug. 24	11	11%	Brighton & Hove Orig.	208—213	165—170	170
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	120—125	...
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	..	...
530,000	20	Oct. 5	12½	22/6	British	44—45	30—32	31
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	75—80	76
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	55—60	...
100,000	10	Nov. 2	—	7%	Cape Town & Dis., Ltd.	1½—2½	6½—7½%	...
100,000	10	Oct. 19	—	4½%	Do. 4½ p.c. Pref.	4—6	6—7	6 5/16—6⅝
100,000	Stk.	June 29	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	73—78	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 27	5/9/4	56/-	Commercial 4 p.c. Stk.	106—108	93—98	94—95
560,000	,,	,,	5½	55/-	Do. 3½ p.c. do.	103—105	93—98	...
475,000	,,	June 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	55—60	...
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	29—34	29
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	50—55	51—52
660,000		Sept. 1	—	6%	Croydon sliding scale.	..	90—95	...
284,975		,,	—	5%	Do. max. div.	..	78—82	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	..	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	...
1,002,180	10	July 13	10	5/0	European, Ltd.	17½—18	10½—11½	10½—10⅞
16,298,975	Stk.	July 27	4/17/4	52/-	Gas and Light — 4 p.c. Ord	98—102	95—97	95½—96½
2,600,000	,,	,,	3½	35/-	Gas and Light — 3½ p.c. max.	76—79	61—64	62½
4,062,235	,,	,,	4	4%	Gas and Light — 4 p.c. Con. Pref.	96—99	76—81	78½—79
4,674,850	,,	June 15	3	3%	Gas and Light — 3 p.c. Con. Deb.	72½—74½	61—64	61½—63
130,000	,,	Dec. 11	10	10%	Gas and Light — 10 p.c. Bonds	..	..	...
	—	—	—	—	Gas and Light — 7½ p.c. Ilford Deb	..	..	...
82,500	,,	Sept. 21	5	65/7½	Hastings & St. L. 5 p.c.	..	95—100	95½—95½
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	77—80	...
70,000	10	May 18	11	7½%	Hongkong & China, Ltd.	16½—16¾	6—7	...
86,600	Stk.	Aug. 24	9	9½%	Hornsey 7 p.c.	..	127—132	...
1,976,000	,,	May 18	9	10%	Imperial Continental	150—160	156—161	156—158
404,800	,,	Aug. 10	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	71—76	73½
235,242	,,	July 27	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.	..	..	91½
165,736	,,	Aug. 10	7/5/6	87/3	Maidstone 5 p.c.	..	87—92	...
63,480	,,	June 29	—	3%	Do. 3 p.c. Deb	..	54—59	...
75,000	5	,,	6	6%	Malta & Mediterranean Met. of Melbourne — 4½ p.c. Deb.	4¼—4¾	3¾—3¾	...
250,000	100	Oct. 2	4½	4½%		99—101	89—96	...
541,920	Stk.	June 1	4	4%	Monte Video, Ltd.	11½—12	62—67	...
1,875,892	,,	July 27	4½	4½%	Newcastle & Gatsh'dCon.	98½—99½	68—70	...
529,705	,,	June 29	3½	3½%	Do. 3½ p.c. Deb.	82—83	67—68	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	..	...
55,940	10	Aug. 24	7/14/0	7/88	,, ,, 7 p.c.	14—15	10½—11½	...
300,000	Stk.	May 18	8	8%	Oriental, Ltd.	117—122	98—103	100—101
60,000	5	—	10	—	Ottoman, Ltd.	7¼—7½	2—3	...
188,120	Stk.	June 29	—	6/3/0%	Plym'th & Stonh'se 5 p.c.	..	93—98	...
60,000	50	Aug. 24	13	65/-	Portsea Island, B	128—131	100—105	...
100,000	50	,,	12	60/-	Do. C	118—121	85—90	...
249,980	5	—	8	—	Primitiva Ord.	5½—6	15/16—1 1/16	11/—13/6
499,960	5	—	5	—	Do. 5 p.c. Pref.	4¼—5	2½—2¾	40/—46/10½
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	70—75	...
600,000	Stk.	July 27	4	4%	Do. ,, ,, 1911	..	55—60	55½—56
346,198	,,	June 29	4	4%	River Plate 4 p.c. Deb.	85—87	55—60	...
150,000	10	Sept. 21	6	6/-	San Paulo — 6 p.c. Pref.	10½—11	5¼—6	...
125,000	50	July 3	5	5%	San Paulo — 5 p.c. Deb.	47—49	35—38	...
135,000	Stk.	Aug. 24	10	5%	Sheffield A	223—224	97—99	...
209,984	,,	,,	10	5%	Do. B	222—224	97—99	...
523,500	,,	,,	10	5%	Do. C	220—222	97—99	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	Nov. 2	9	7%	South African	10½—11½	7—9*	...
6,609,895	Stk.	July 27	5/4/0	5%	South Met. Ord.	111—113	94—97	94½—96
250,000	,,	July 13	—	5%	Do. Red. Pref.	..	94—96	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	61—64	61½
224,830	,,	Aug. 24	8½	8½%	South Shields Con. Stk.	157—159	106—108	...
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	114—116	97—100	97½—98½
368,837	,,	June 15	5	5%	Do. 5 p.c. Deb. Stk.	116—118	95—100	...
647,740	,,	Nov. 2	5	7%	Southampton Ord.	99—102	77—82*	...
121,275	,,	June 29	4	4%	Do. 4 p.c. Deb. Stk.	..	63—68	...
120,000	,,	July 27	—	7½%	Tottenham and District — A 5 p.c.	135—138	112—117	...
782,275	,,	,,	6	6%	Tottenham and District — B 3½ p.c.	115—117	98—103	100—101
181,255	,,	June 15	4	4%	Tottenham and District — 4 p.c. Deb.	87—89	75—80	79
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	⅛—¼	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	20—30	...
236,476	Stk.	Aug. 24	5	2½%	Tynemouth 5 p.c. max.	108½—109	79—81	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 27	8½	72/6	Wandsworth A 5 p.c.	151—156	111—115	...
255,636	,,	,,	6½	57/6	Do. B 3½ p.c.	129—134	95—100	...
108,075	,,	,,	—	50/9	Do. C.	..	87—92	...
140,865	,,	,,	—	50/9	New Ordinary	..	87—92	...
352,000	,,	,,	6½	53/9	Wimbledon 5 p.c.	117—122	95—100	...
98,000	,,	,,	6½	58/9	Epsom 5 p.c.	121—126	95—100	...
88,416	,,	June 29	3	3%	3 p.c Deb. Stk.	66—69	57—60	...

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